



Learning Analytics

Should we be concerned about the digital “quantification” of learning?

Simon Buckingham Shum

Knowledge Media Institute

The Open University UK



simon.buckinghamshum.net



[linkedin.com/in/simon](https://www.linkedin.com/in/simon)



[@sbskmi](#) [#LearningAnalytics](#)



aim

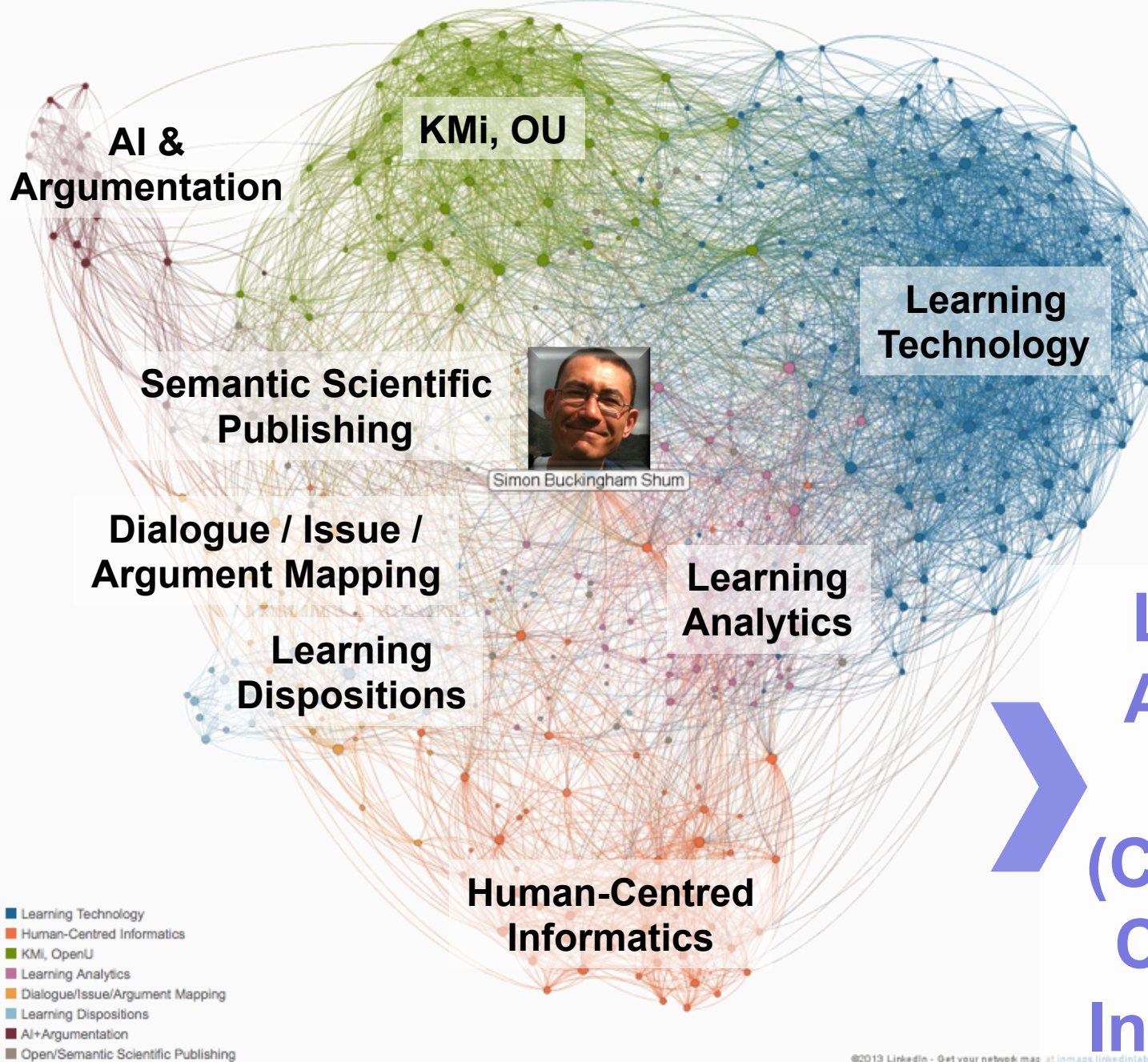
leave with a better sense of the

analytics design space

+

better questions

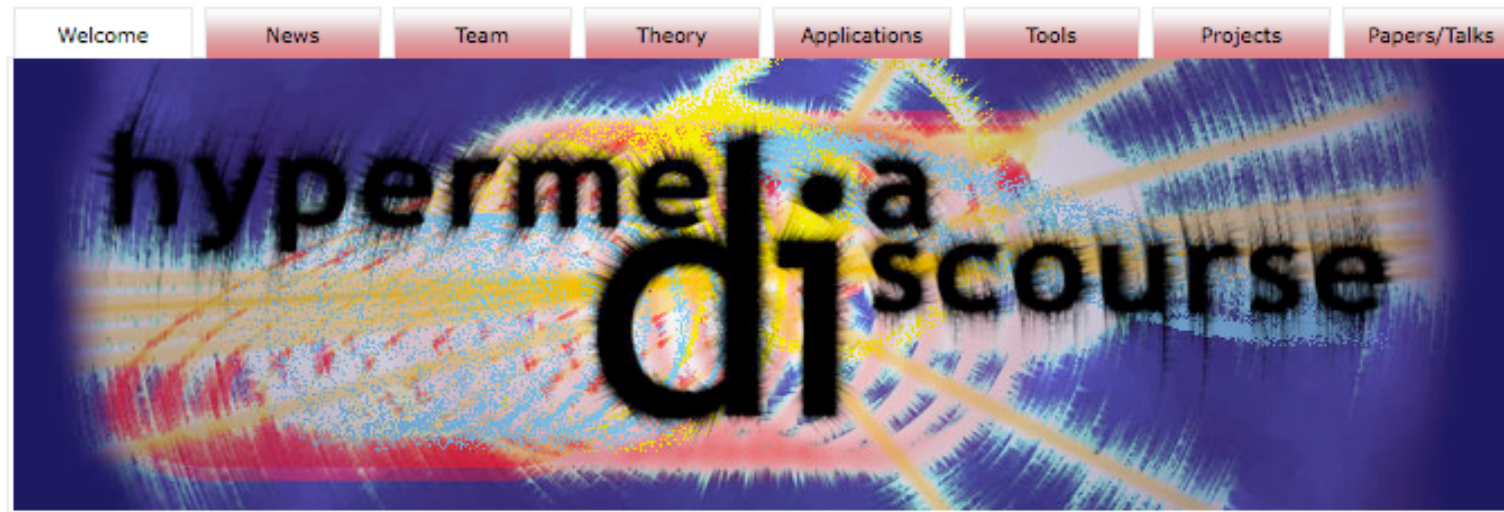
than you can ask right now





**70-strong lab prototyping next generation
learning / collaboration / social media
analytics / future internet**

The Hypermedia Discourse Group Knowledge Media Institute, Open University:



<http://kmi.open.ac.uk/projects/member/simon-buckingham-shum>

Funders span disciplines, from basic research to applications:



**Scholarship
and
Research**

make the invisible visible

make the opaque permeable

make the ephemeral persistent

**by using digital tools to craft narrative
around ideas + documents + multimedia**

make the invisible visible

make the opaque permeable

make the ephemeral persistent

**by using data about, and generated by
learners, to visualize their progress**

From an analytics product review...





From an analytics product review...

“Some have tried to argue that this technology doesn't work out cost effectively when compared to conventional tests... but this misses a huge point. More often than not, we test after the event and discover the problem — but this is too late..”

Aquarium Analytics!



seneye

devices

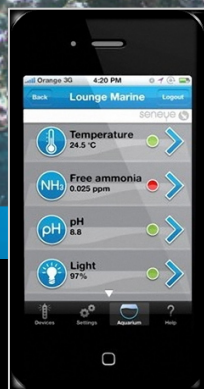
help

Search entire shop here...



the biggest innovation in
aquatics has arrived.

Understanding what is happening inside your aquarium is vital to ensuring that the aquatic life remains healthy. This revolutionary water monitoring device allows you to continuously track the changes in the water parameters, alerting you to the problems before they affect the fish. Protect your fish with a seneye monitor.



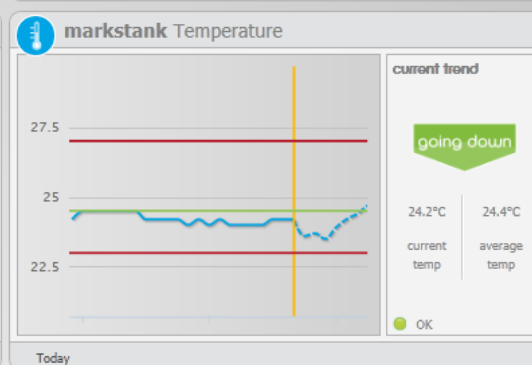
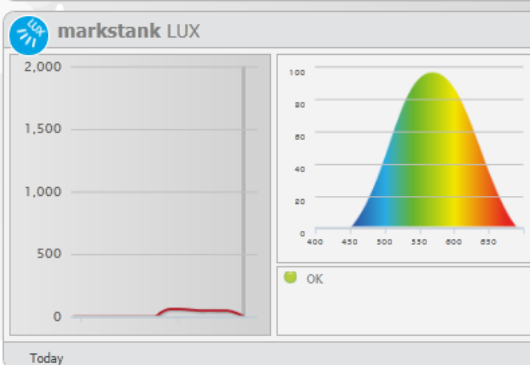
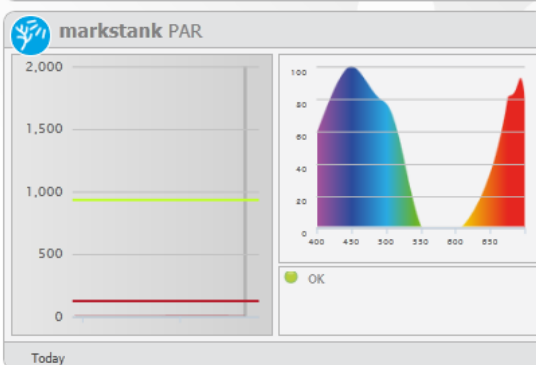
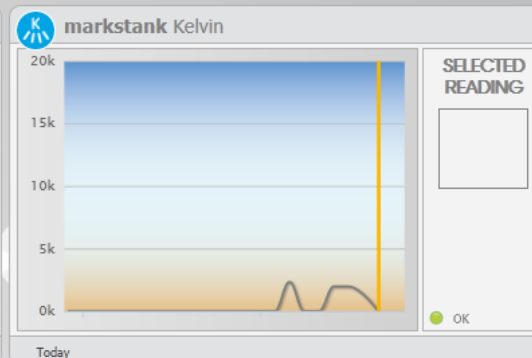
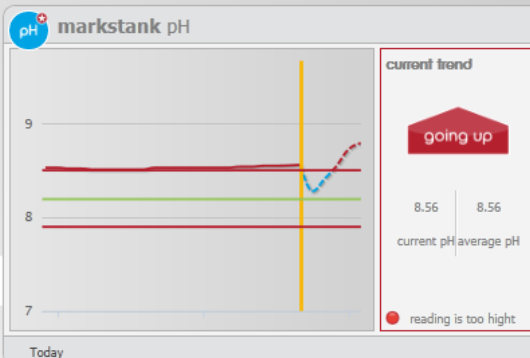
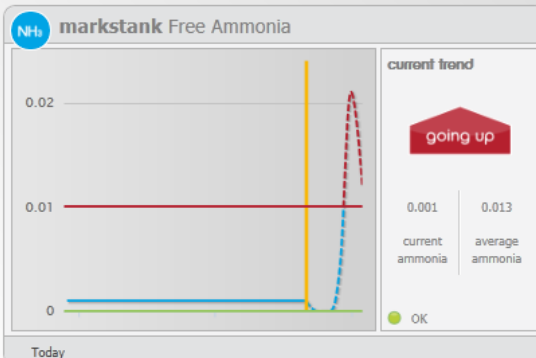
graded the T8 tubes in the office planted aquarium and saw a PAR it





Reef Overview markstank

protected by seneeye





How is your aquatic ecosystem?

“This means that the keeper can be notified before water conditions directly harm the fish—an assured outcome of predictive software that lets you know if it looks like the pH is due to drop, or the temperature is on its way up.

This way, it's a real fish saver, as opposed to a forensic examiner, post-wipeout.”

(From a review of *Seneye*, in a hobbyist magazine)



How is your learning ecosystem?

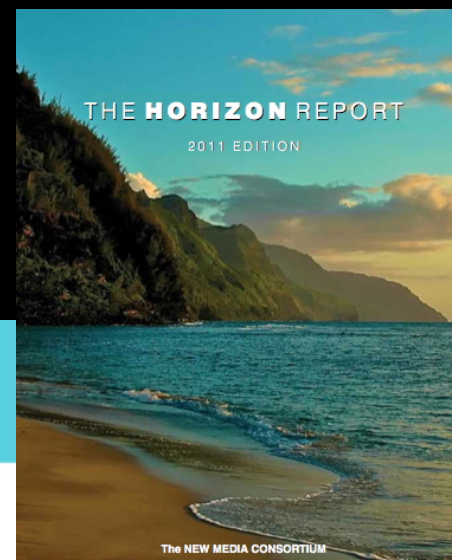
This means that the teacher can be notified before learning conditions directly harm the students — an assured outcome of predictive software that lets you know if it looks like engagement is due to drop, or distraction is on its way up.

This way, it's a real student saver, as opposed to a forensic examiner, post-wipeout.



The rise of analytics...

NMC *Horizon* 2011 Report: Learning Analytics (4-5yrs adoption)



LEARNING ANALYTICS

Time-to-Adoption Horizon: Four to Five Years

Learning analytics promises to harness the power of advances in data mining, interpretation, and modeling to improve understandings of teaching and learning, and to tailor education to individual students more effectively. Still in its early stages, learning analytics responds to calls for accountability on campuses across the country, and leverages the vast amount of data produced by students in day-to-day academic activities. While learning analytics has already been used in admissions and fund-raising efforts on several campuses, “academic analytics” is just beginning to take shape.

The rise of analytics...



Ed-Tech startups explosive growth

Top Ed-Tech Trends of 2012: The Business of Ed-Tech

by [AUDREY WATTERS](#) on 19 NOV, 2012

Part 1 of my [Top Ed-Tech Trends of 2012](#) series

Last year when I wrote about the [top 10 trends in ed-tech](#), I saved “[The Business of Ed-Tech](#)” for the penultimate post. I’m starting my series there this time around. There’ll be plenty of opportunity throughout these year-end posts of mine to discuss the ways in which technology has shaped teaching and learning in 2012. But I want to recognize from the outset much of what we’ve seen this year is how technology will shape the business of education.

The (Story of the) Business of Ed-Tech

It’s been a major story this year: broken educational institutions [under seige by Silicon Valley](#).

AUTHOR



Audrey Watters is an education writer, rabble-rouser, rambler, recovering academic, lifelong learner, serial dropout, part-time badass, mom.



RECOMMENDED READING



- [The Myth and Millennialism of "Disruptive Innovation"](#), May 24, 2013
- [Click Here to Save Education: Evgeny Morozov](#)



The rise of analytics...

LMS/VLEs + Analytics

IBM and Desire2Learn Introduce New Services and Software offerings to K-12 and Higher Education

Companies deliver analytics-based intelligent learning environment.

ARMONK, N.Y. and KITCHENER, Ontario, April 13, 2012

IBM (NYSE: [IBM](#)) and [Desire2Learn Incorporated](#) (Desire2Learn) today announced new consulting services and software offerings that take the power of predictive analytics to improve outcomes in education. The new education platform will address the needs for schools, colleges and universities to improve the quality of education for students, enhance the effectiveness of teachers, and empower administrators to create more personalized learning environments.

Publishers + Analytics

Pearson and Knewton Partner to Advance Next Generation of Digital Education

Knewton's Adaptive Learning Platform™ to be integrated with Pearson's higher education content and courses

iSTRATEGY
HigherEd Analytics

OUT iSTRATEGY :: PRODUCT TOUR CONTACT US :: LOG-IN

TRANSFORM DATA INTO PERFORMANCE

iStrategy has joined Blackboard as Blackboard Analytics™

Learn more >

McGraw-Hill to Buy Adaptive-Learning Company

June 20, 2013, 3:07 pm

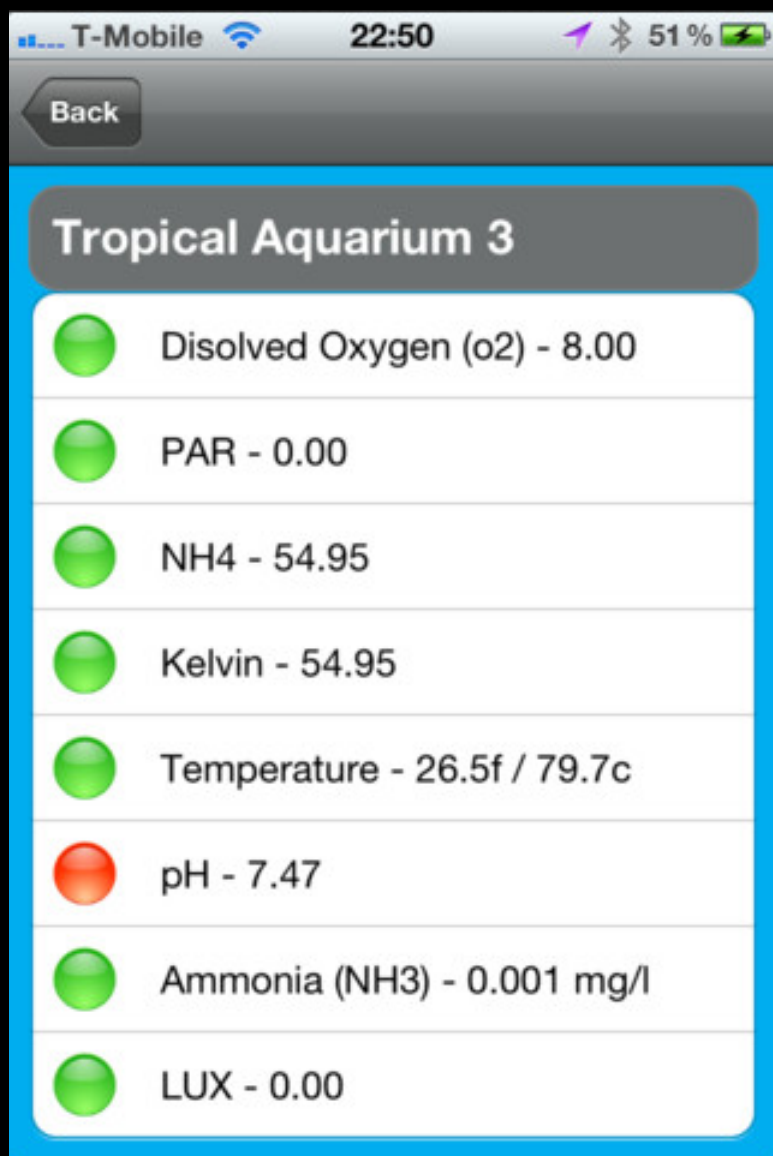
By Sara Grossman

[f](#) [t](#) [in](#) [g+](#) [e](#) [p](#) Comments (3)

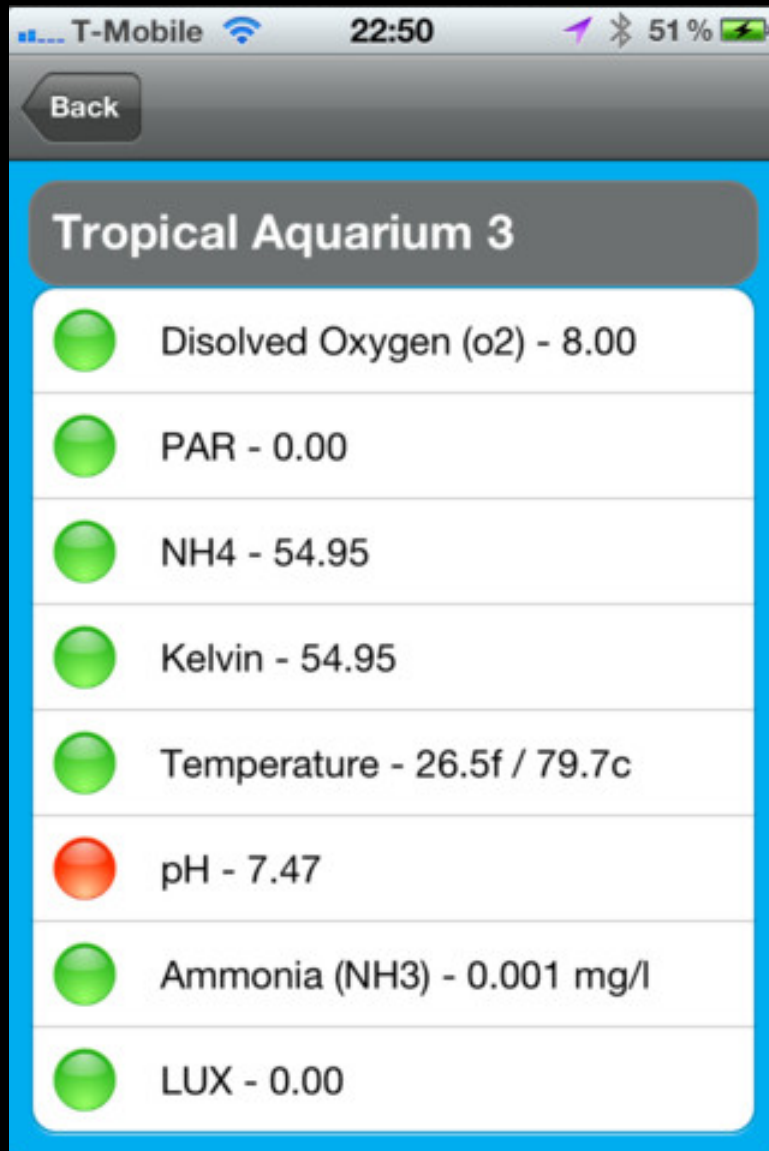
McGraw-Hill Education, one of the largest textbook publishers, announced on Thursday that it would acquire the ALEKS Corporation, a developer of so-called adaptive-learning technology.



Back to Aquarium Analytics...



Back to Aquarium Analytics...



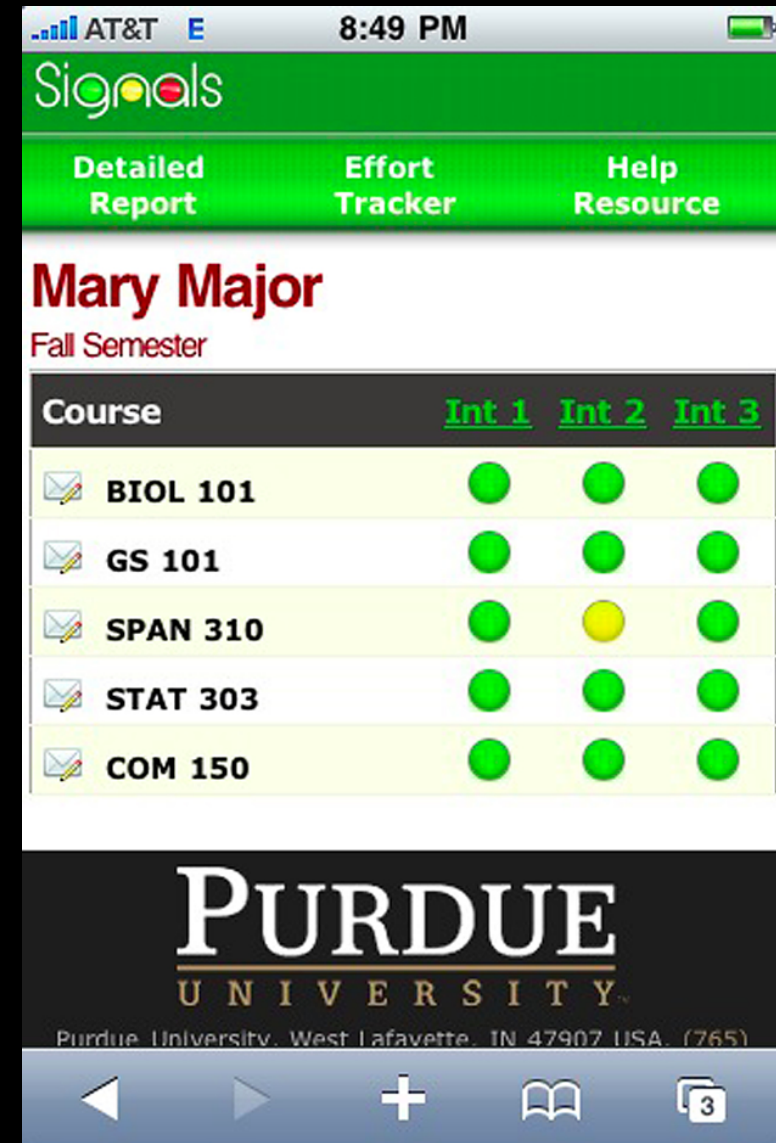
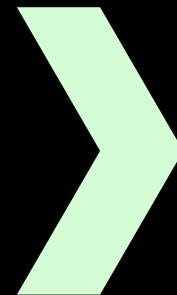
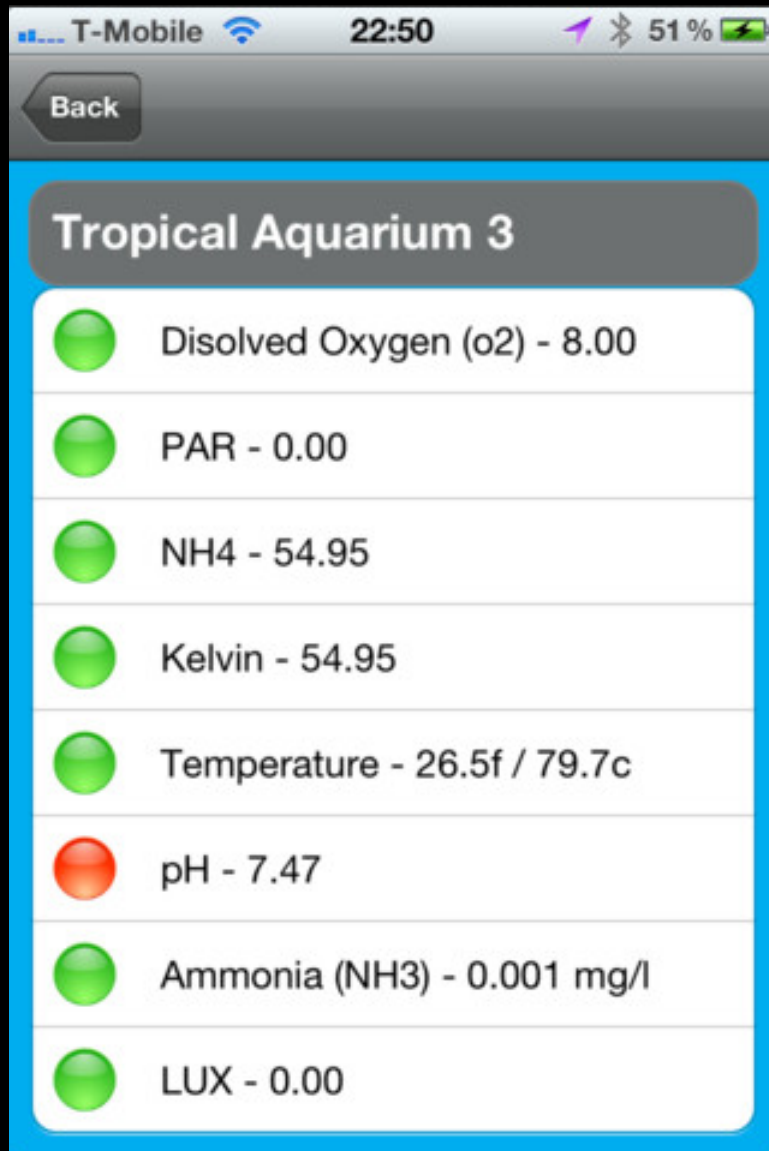
~~fish~~

~~aquarium science~~

learners?

learning science
instructional design

Purdue University *Signals*: real time traffic-lights for students based on predictive model



Purdue University *Signals*: real time traffic-lights for students based on predictive model



MODEL:

- ACT or SAT score
- Overall grade-point average
- CMS usage composite
- CMS assessment composite
- CMS assignment composite
- CMS calendar composite

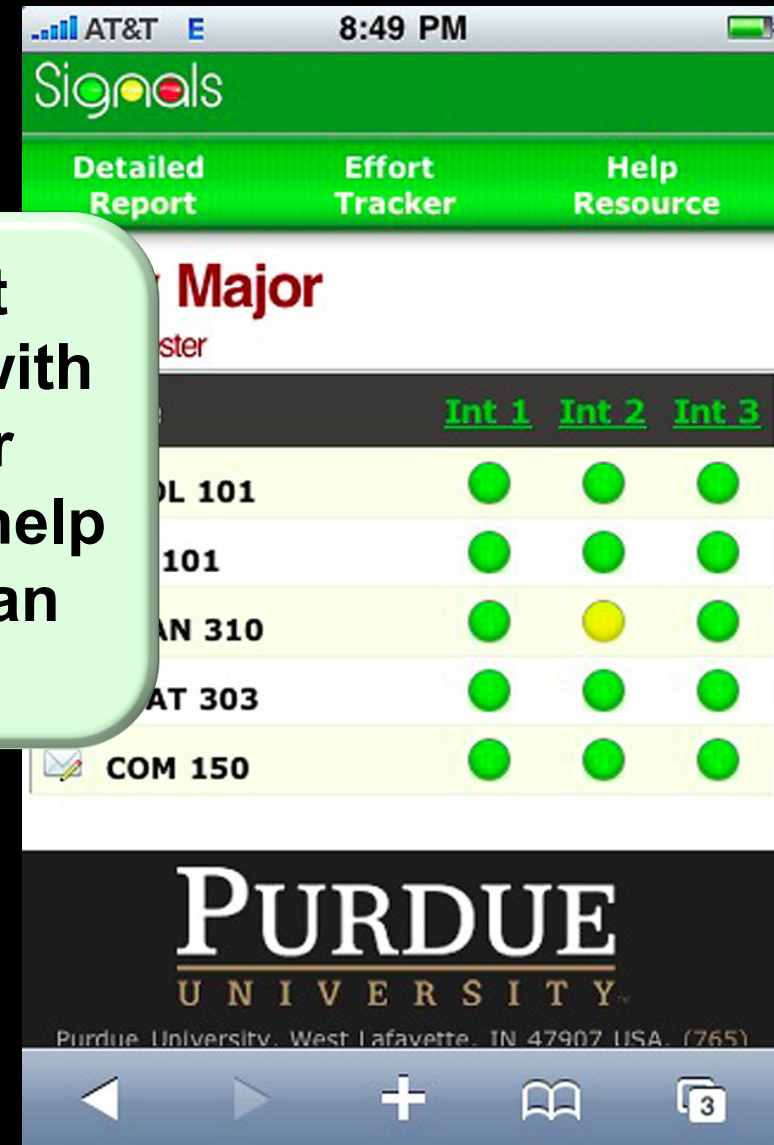
Predicted 66%-80%
of struggling
students who
needed help

Course	Int 1	Int 2	Int 3
BIOL 101	Green	Green	Green
GS 101	Green	Green	Green
SPAN 310	Green	Yellow	Green
STAT 303	Green	Green	Green
COM 150	Green	Green	Green

Purdue University *Signals*: real time traffic-lights for students based on predictive model

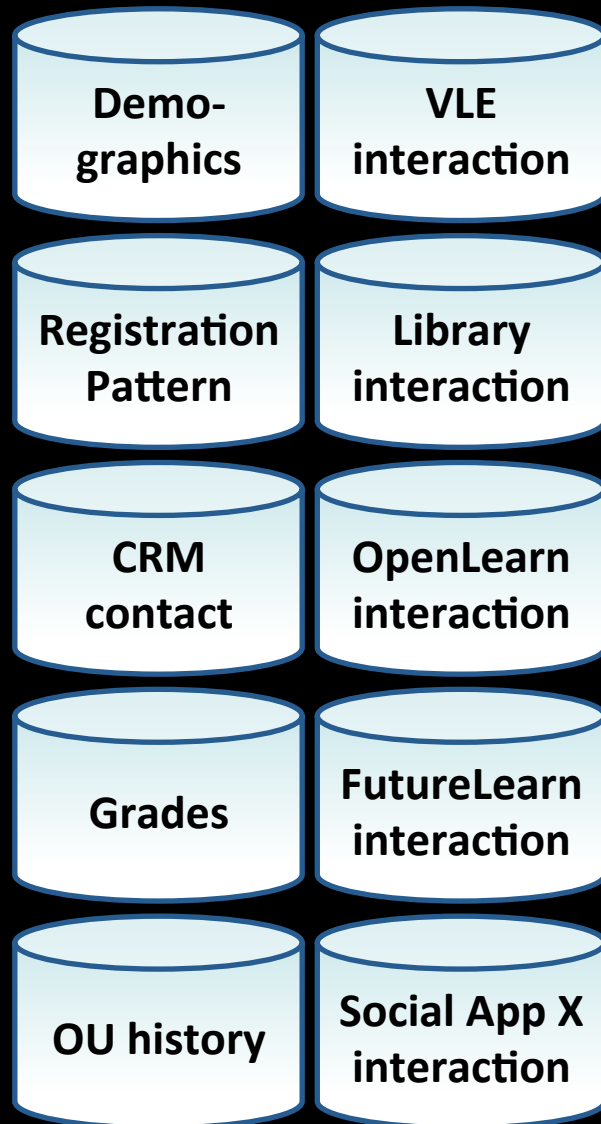


“Results thus far show that students who have engaged with Course Signals have higher average grades and seek out help resources at a higher rate than other students.”



Pistilli, M. D., Arnold, K. and Bethune, M., Signals: Using Academic Analytics to Promote Student Success. *EDUCAUSE Review Online*, July/Aug., (2012).
<http://www.educause.edu/ero/article/signals-using-academic-analytics-promote-student-success>

Predictive analytics @open.edu



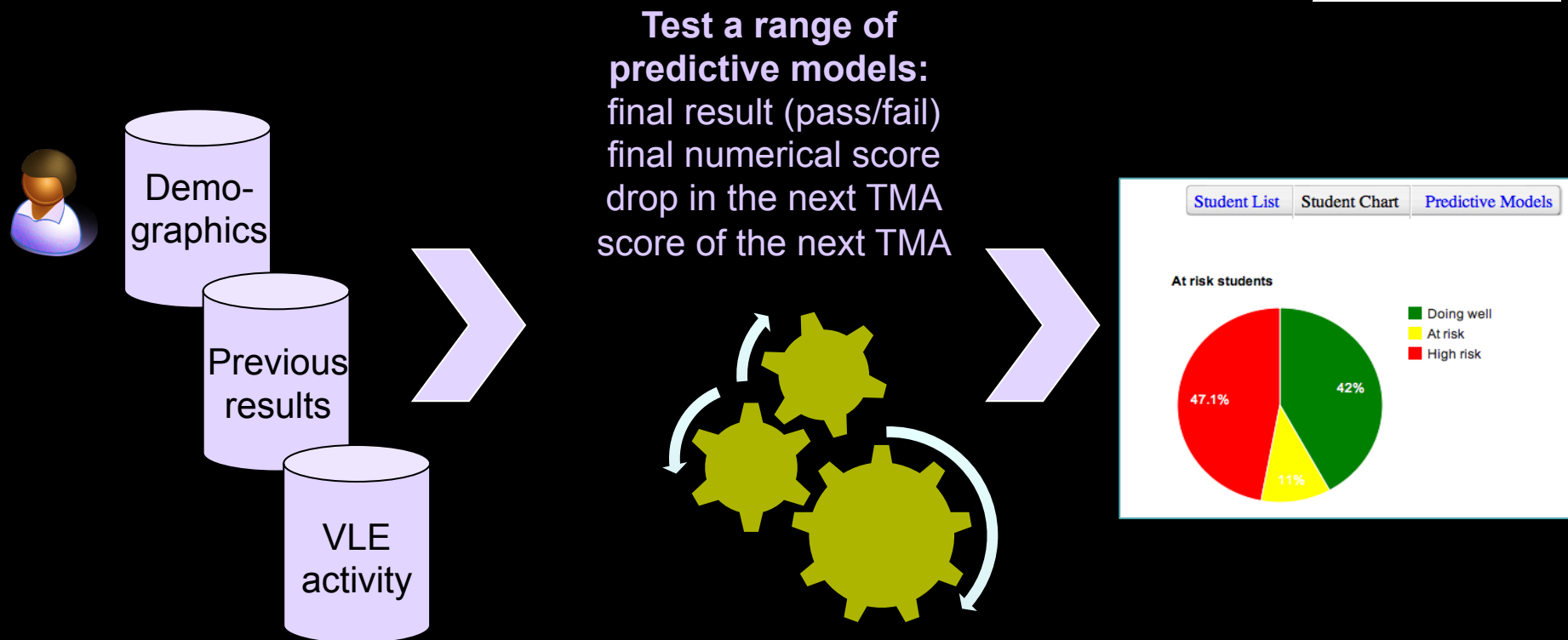
How early can we predict likelihood of dropout, formal withdrawal, failure?

Now exploring conventional statistics, machine learning and growing datasets

Predictive analytics @open.edu



Adding in user interaction data from the VLE



Hmmm...

no learning sciences/design
underpinning these predictive models of student success

models based on a mix of
institutional know-how
about student success, and mining
behavioural data

**the opportunity for the
learning sciences
to combine with your university's
collective
intelligence**

**predictive models
are exciting**

**but there are many other
kinds of analytics**

Analytics 101

Elaborated version of figure from Doug Clow:

<http://www.slideshare.net/dougclow/the-learning-analytics-cycle-closing-the-loop-effectively> (slide 5)



ethics

What kinds of learners?
What kinds of learning?

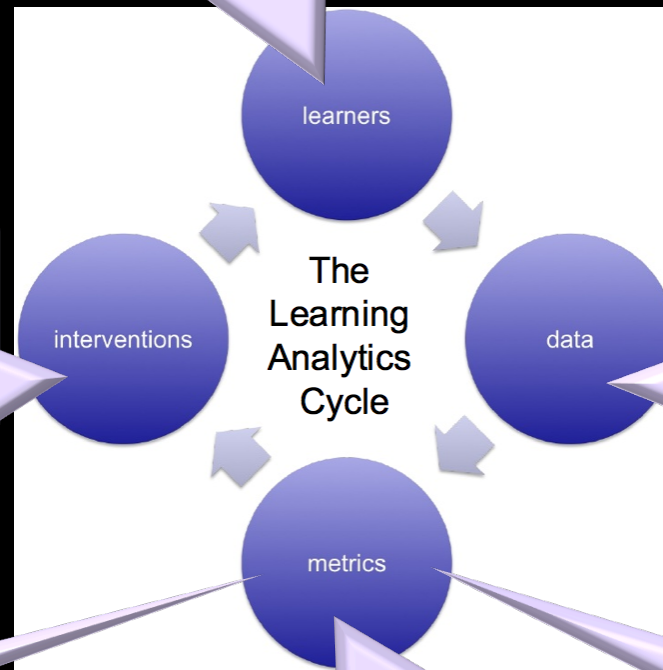
What human +/-
software
interventions /
recommendations?

What data could be
generated digitally
from the use context?
(you can invent future
technologies if need)

Does your theory
predict patterns
signifying learning?

What analytical tools
could be used to find
such patterns?

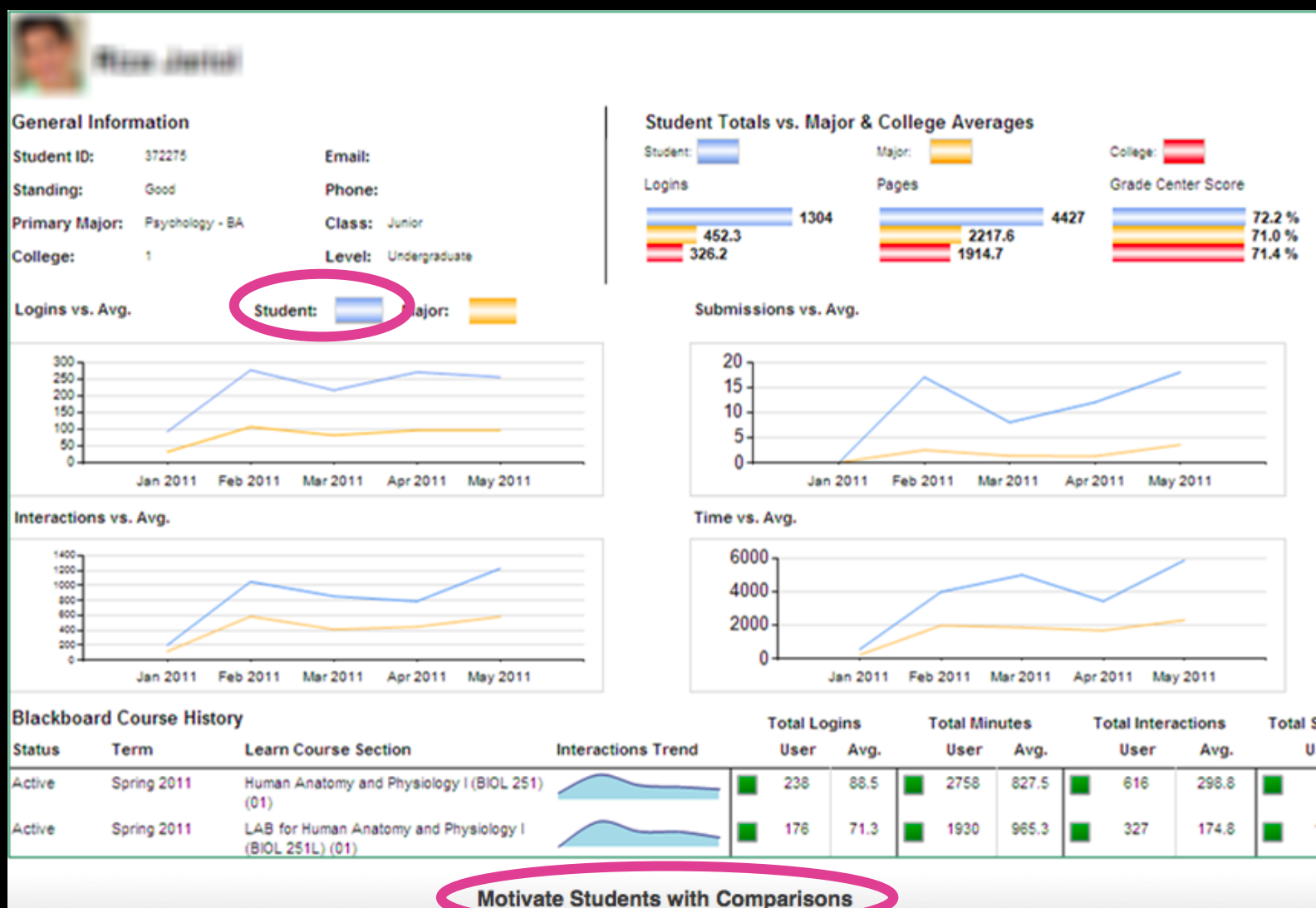
How to render the analytics,
for whom, and will they
understand them?





Analytics coming to a VLE near you: Blackboard basic summary stats

<http://www.blackboard.com/Platforms/Analytics/Products/Blackboard-Analytics-for-Learn.aspx>





Student Activity Dashboard (Erik Duval)

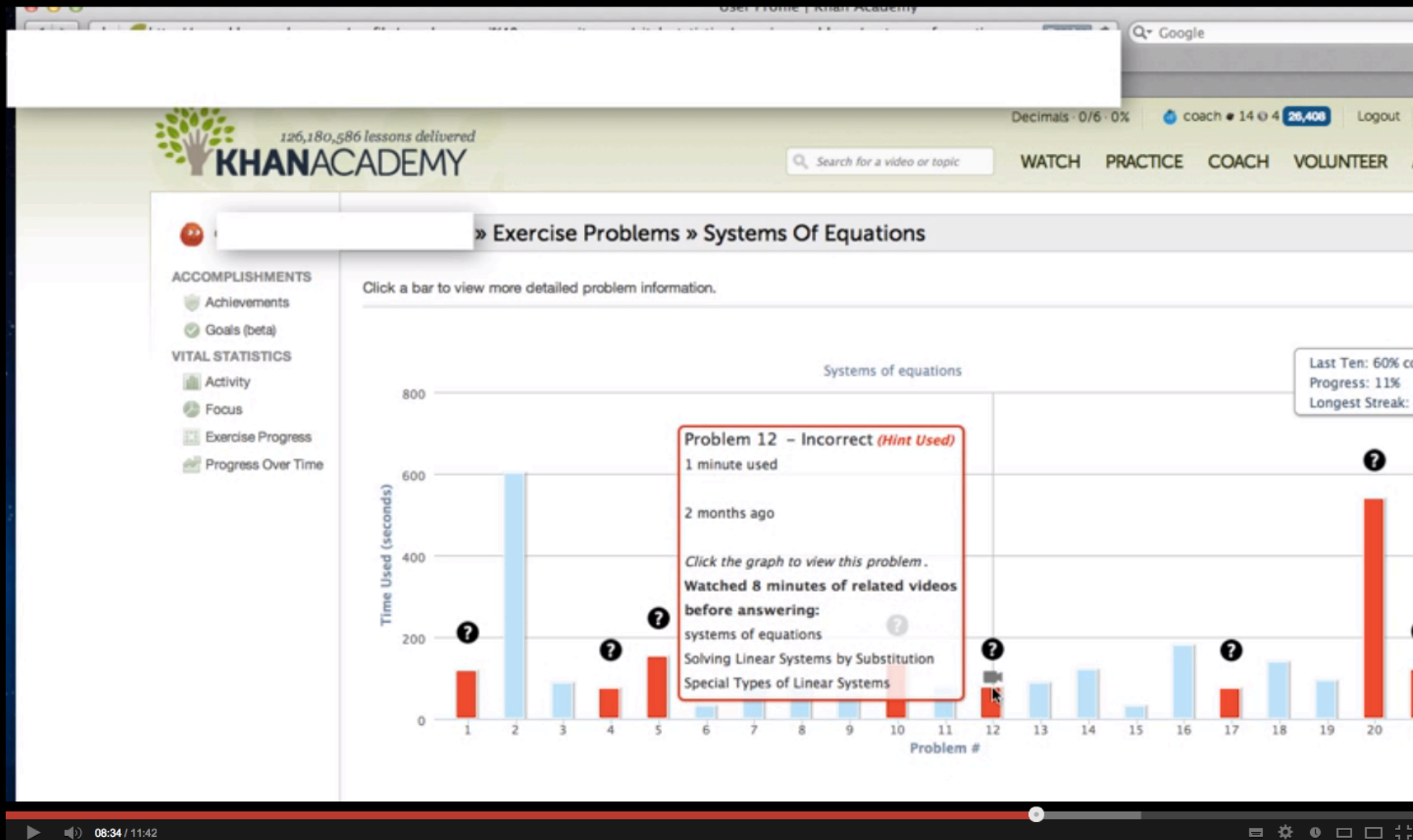


Khan Academy has extended great instructional movies with a tutoring platform with detailed analytics



<http://www.youtube.com/watch?v=DLt6mMQH1OY>

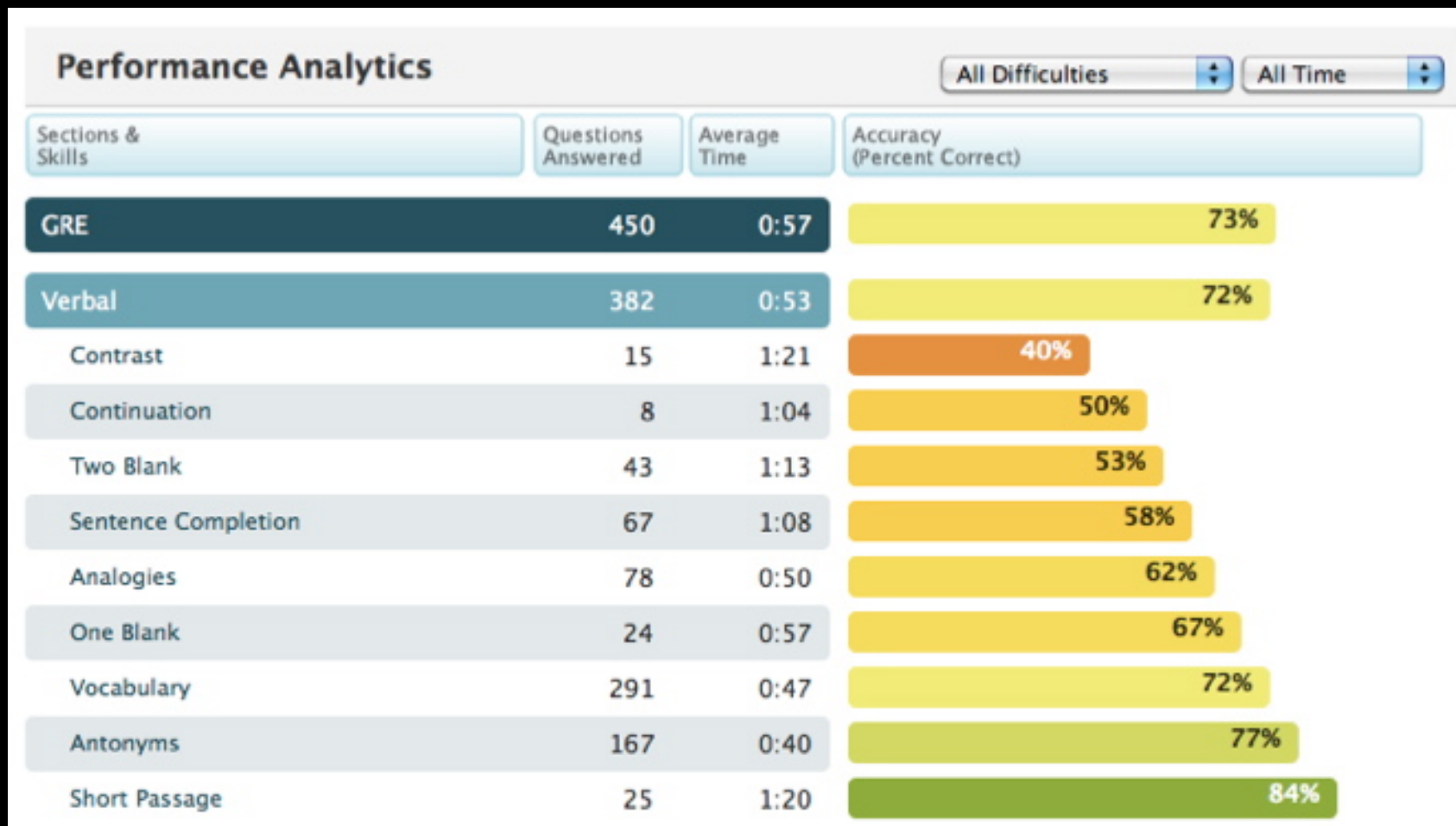
Khan Academy Exercises and Reports Overview



Adaptive platforms generate fine-grained analytics on individuals' curriculum mastery



<https://grockit.com/research>



Intelligent tutoring for skills mastery (CMU)

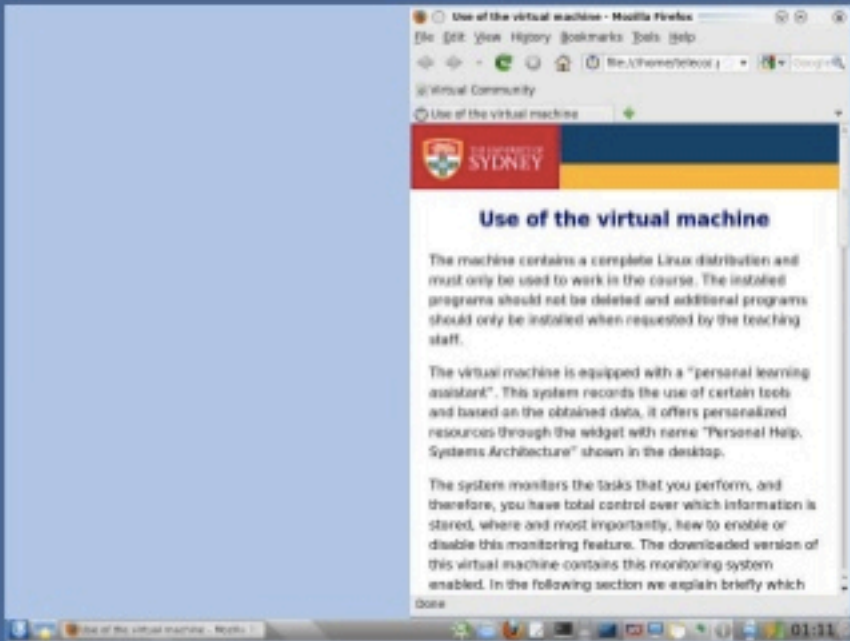
<http://oli.cmu.edu>



The screenshot shows the STAT TUTOR interface. On the left is a sidebar with a 'WORK PLAN' section containing steps like 'Understand the Problem', 'Question 1', 'Q2', 'Reflect on Question', 'Analyze Data', 'Draw Conclusions', and 'Summarize'. The main area has tabs for 'Problem', 'Questions', 'Variables', and 'About'. Under 'Questions', two questions are listed: Q1 about drinking habits and Q2 about the honor system. Below the questions, a section titled 'Determine Displays and Measures (Question One)' asks for a 'meaningful display' and a 'meaningful numerical summary'. A list of display options is shown: Side-by-side boxplots, Scatterplot, Two-way table, Piechart, and Histogram. At the bottom, a hint box says 'Hint: Think about how you classified the relevant variable for this question.' and a 'get next hint' button is visible.

“In this study, results showed that OLI-Statistics students [blended learning] learned a full semester’s worth of material in half as much time and performed as well or better than students learning from traditional instruction over a full semester.”

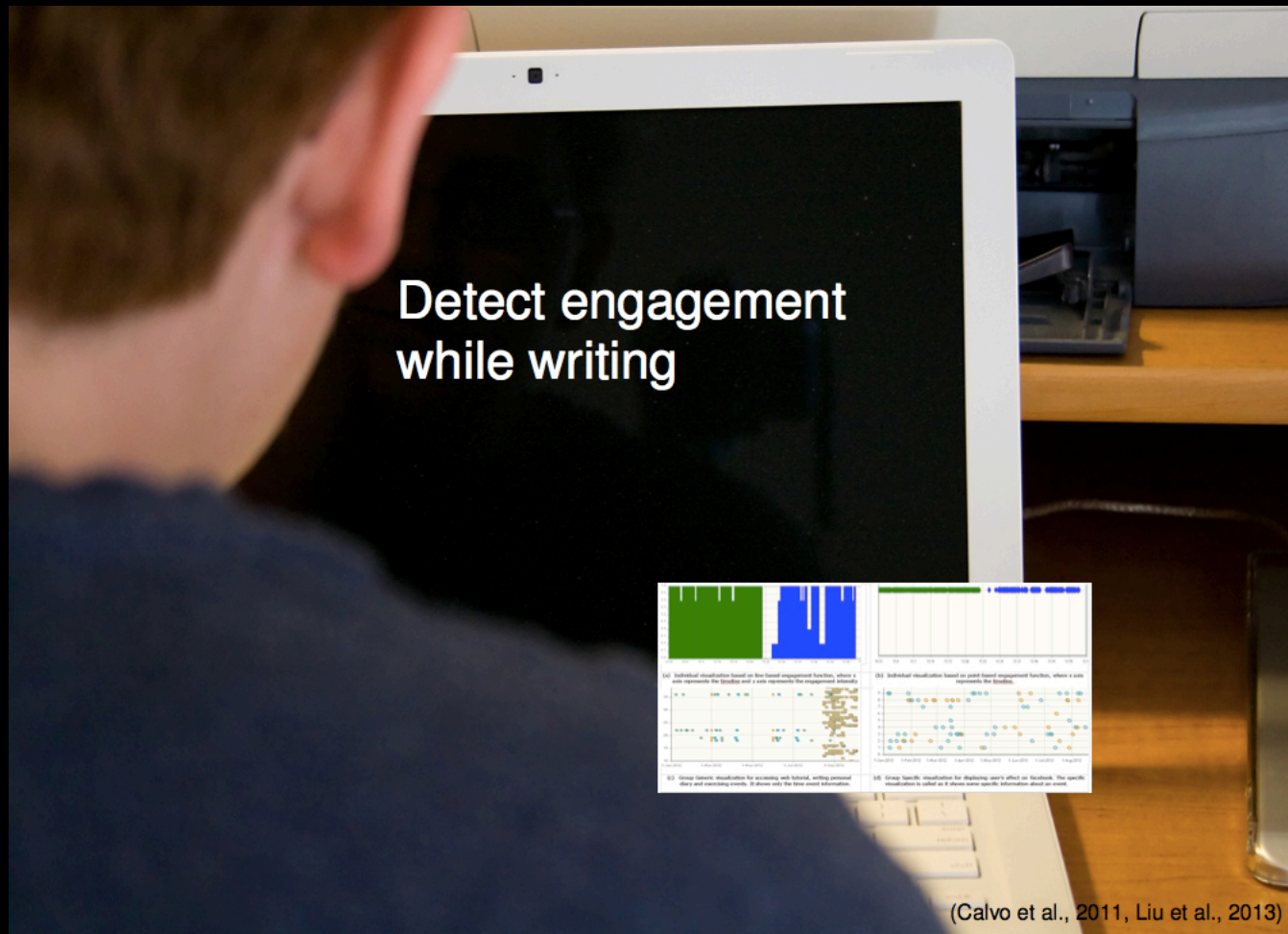
Track learner activity with a virtual machine (Abelardo Pardo, LAK13 Conference Keynote)



A clearly identified environment within your computer

(Pardo & Delgado Kloos, 2011)

Track learner activity with a virtual machine (Abelardo Pardo, LAK13 Conference Keynote)



Abelardo Pardo

Bridging the Middle Space with Learning Analytics

41

http://www.slideshare.net/abelardo_pardo/bridging-the-middle-space-with-learning-analytics

Calvo, R., O'Rourke, S.T., Jones, J., Yacef, K., Reimann, P., 2011. Collaborative Writing Support Tools on the Cloud. *IEEE Transactions on Learning Technologies*, 4(1):88–97

macro
meso
micro
analytics

Macro/Meso/Micro Learning Analytics



Macro:
region/state/national/international

League Tables

**Data
Interoperability
Initiatives**

Macro/Meso/Micro Learning Analytics



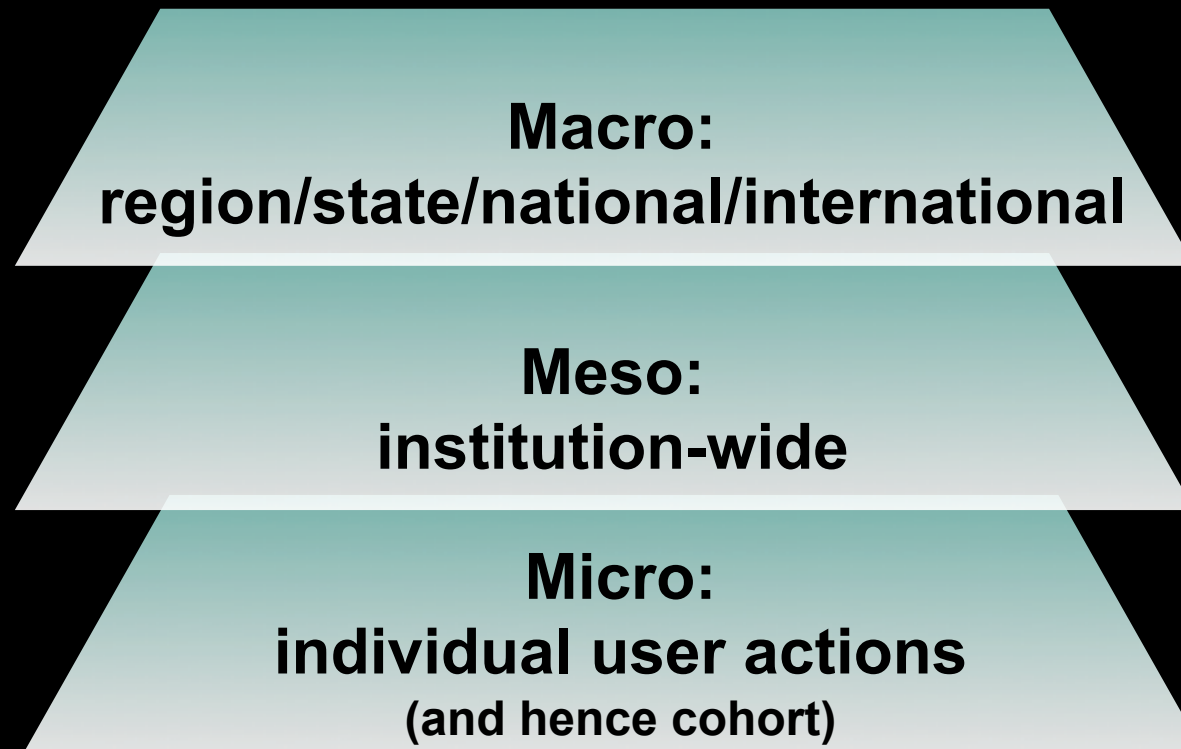
Macro:
region/state/national/international

Meso:
institution-wide

**Univ. Student
info Systems**

**Business
Intelligence
products to
improve org
processes**

Macro/Meso/Micro Learning Analytics

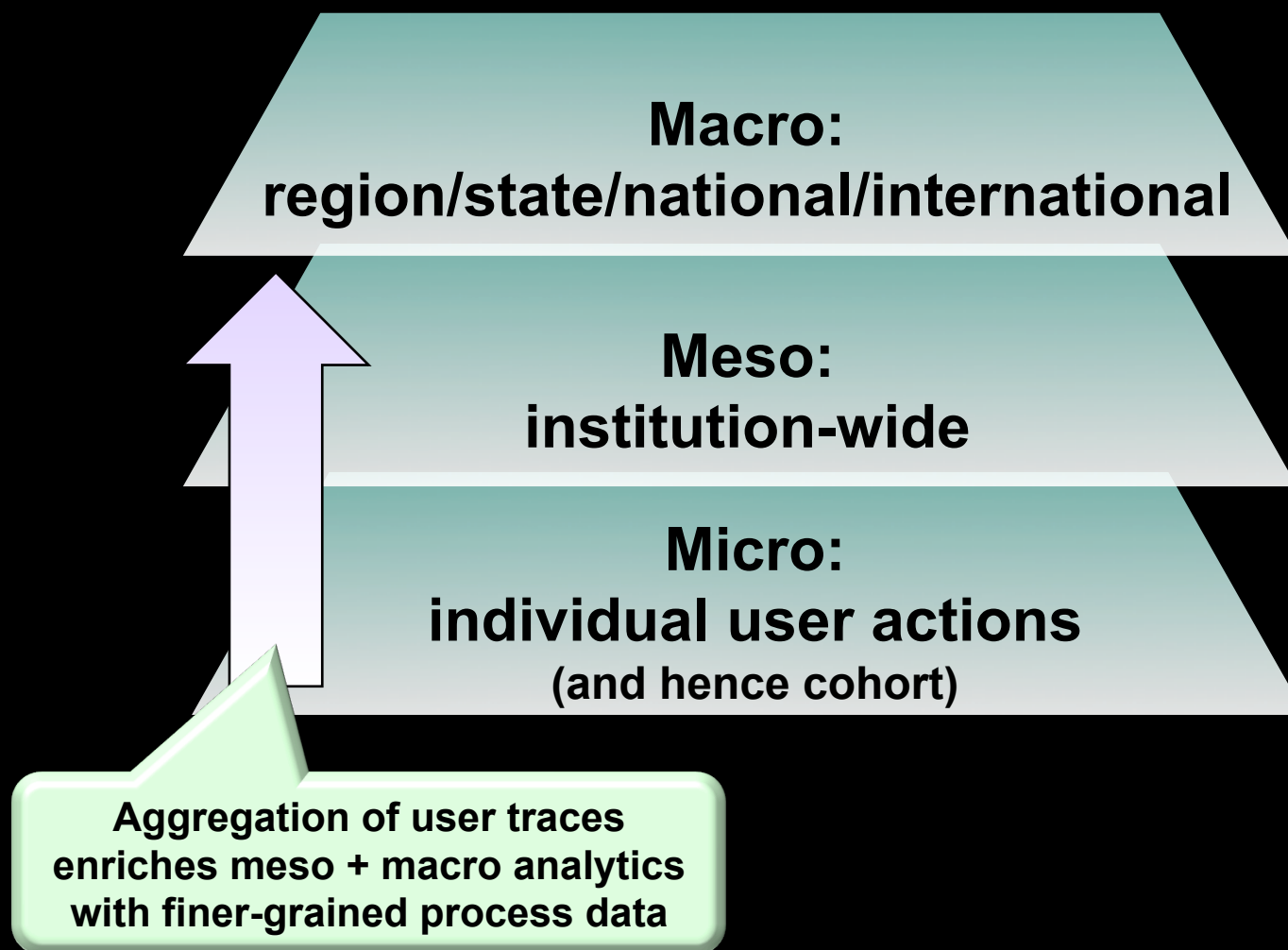


**Learning
Analytics**



Hard distinctions between Learning + Academic analytics may dissolve

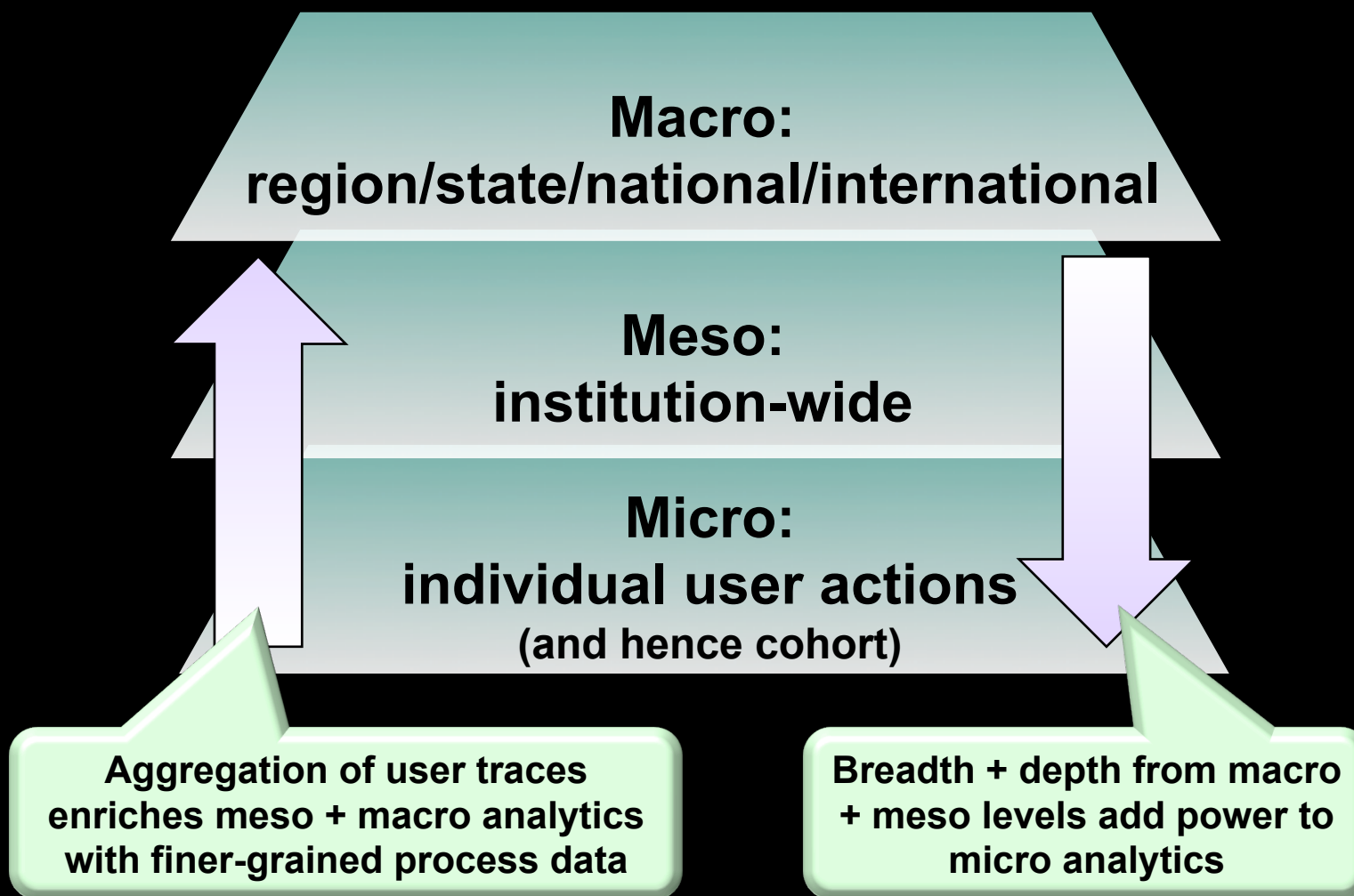
...as they get joined up, each level enriches the others



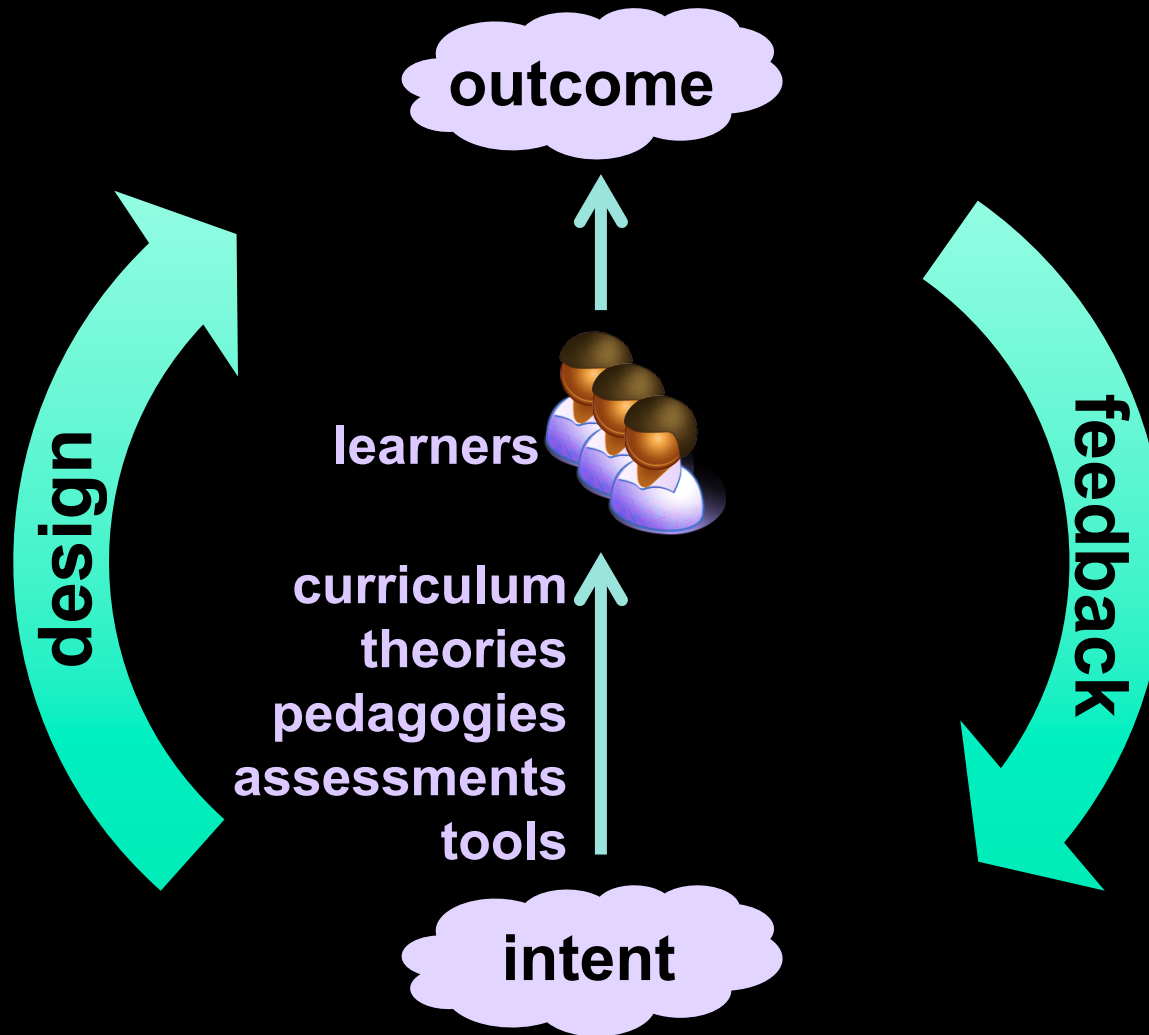


Hard distinctions between Learning + Academic analytics may dissolve

...as they get joined up, each level enriches the others



Analytics are not the end, but a means
The goal is to optimize the whole system



researchers / educators / instructional designers

Webinar replay on OU analytics strategy



A screenshot of a Blackboard webinar interface. The top bar shows 'AUDIO & VIDEO' and 'Fit Page'. The main content area displays a slide titled 'Developing institutional capabilities and strengths 3 year strategic roadmap'. The slide includes the Open University logo and text stating: 'The OU is developing its capabilities in 10 key areas that build the underpinning strengths required for the effective deployment of analytics'. A central circular diagram illustrates these 10 key areas, organized into three concentric rings. The innermost ring contains 'Analysis and creation of insight' and 'Availability of data'. The middle ring includes 'Operational analysis models', 'Data exploration and rapid prototyping', 'Technology architecture', 'Data storage and access for analysis', and 'Data collection'. The outermost ring is divided into 'Prototype - design - build pipeline', 'Direct intervention', and 'For action - In action - On action'. Text on the slide explains that the university needs world-class capability in data science to continually mine data and build rapid prototypes, and that benefits will be realized through existing business processes impacting students directly and through enhancement of the student learning experience. A 'Learning and Teaching' section at the bottom of the slide states: 'We need to ensure we have the right architecture and processes for collecting the right data and making it accessible for analytics - we need a 'big data' mind-set'. The interface also shows a 'PARTICIPANTS' list on the left and a 'CHAT - Supervised' window at the bottom left.

Developing institutional capabilities and strengths 3 year strategic roadmap

The OU is developing its capabilities in 10 key areas that build the underpinning strengths required for the effective deployment of analytics

The university needs world class capability in data science to continually mine the data and build rapid prototypes of simple tools, and a clear pipeline for the outputs to be mainstreamed into operations

Benefits will be realised through existing business processes impacting on students directly and through enhancement of the student learning experience – we will develop an ‘analytics mind-set’ in these areas

We need to ensure we have the right architecture and processes for collecting the right data and making it accessible for analytics – we need a ‘big data’ mind-set

Learning and Teaching

p.6


Analytics for student succe...

**Optimize the system
for *what*?**

design analytics to achieve your university's strategic goals

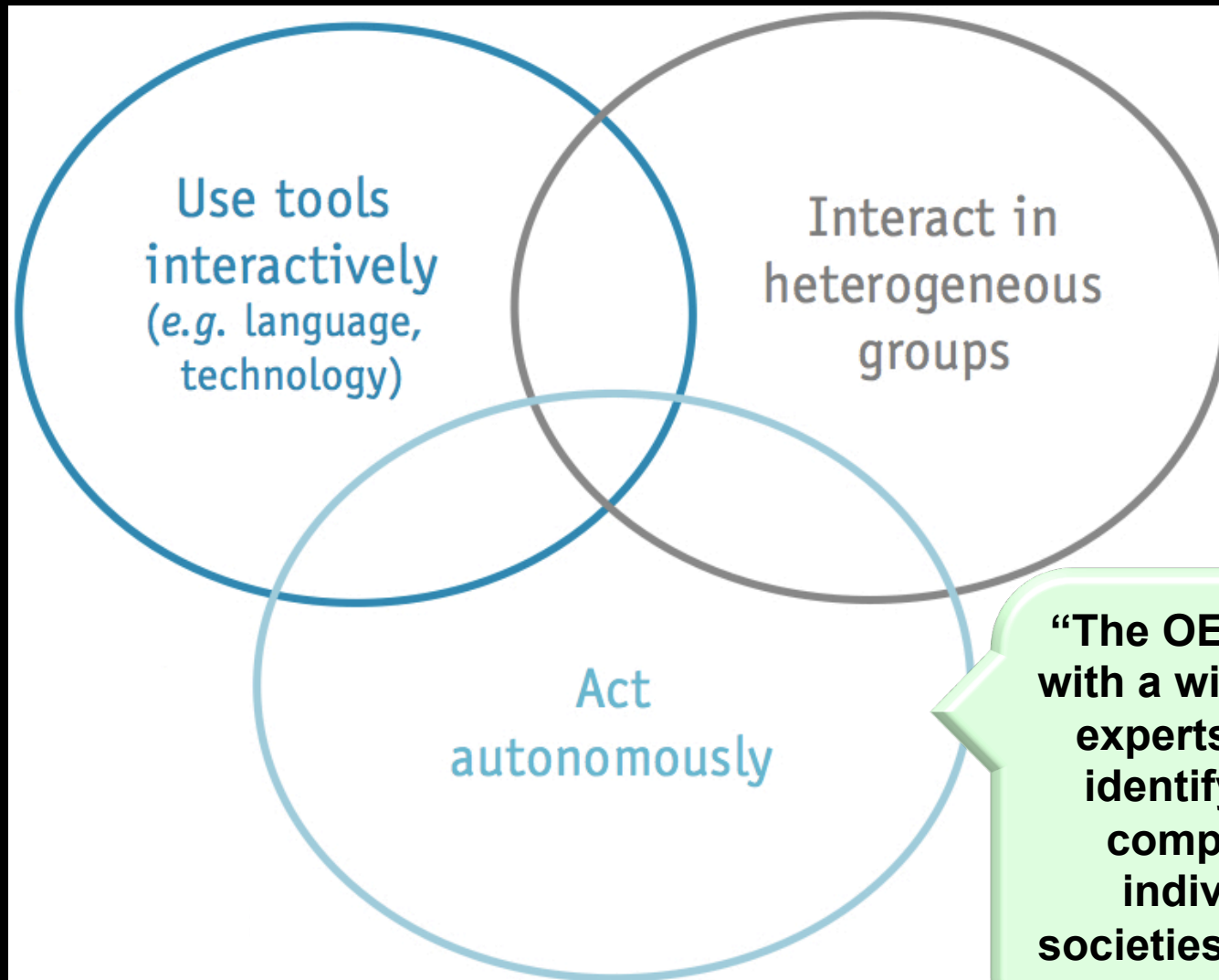
**(increasingly differentiated as the sector
stratifies?)**

analytics for building learners who handle...

- uncertainty**
 - novel dilemmas**
 - conflicting viewpoints**
 - VUCA life**
 - in C21**
- 

OECD DeSeCo Final Report

Definition & Selection of Key Competencies



“The OECD has collaborated with a wide range of scholars, experts and institutions to identify a small set of key competencies that help individuals and whole societies to meet their goals.”

analytics for social capital



Social Network Analysis (SNAPP)

FORUM A

Thread: Thread Start Reply	
Total posts: 14 Unread posts: 0	
<input type="checkbox"/> Thread Start	Aneesha Bakharia
<input type="checkbox"/> SNA Tools	Student A
<input type="checkbox"/> RE:SNA Tools	Aneesha Bakharia
<input type="checkbox"/> RE:RE:SNA Tools	Student B
<input type="checkbox"/> RE:RE:SNA Tools	Student C
<input type="checkbox"/> RE:RE:SNA Tools	Aneesha Bakharia
<input type="checkbox"/> Centrality analysis	Student A
<input type="checkbox"/> RE:Centrality analysis	Aneesha Bakharia
<input type="checkbox"/> Temporal Animations	Student A
<input type="checkbox"/> RE:Temporal Animations	Aneesha Bakharia
<input type="checkbox"/> RE:RE:Temporal Animations	Student B
<input type="checkbox"/> RE:RE:Temporal Animations	Student C
<input type="checkbox"/> SNA Diagrams for Facebook	Student B
<input type="checkbox"/> RE:SNA Diagrams for Facebook	Aneesha Bakharia

FORUM B

Thread: RE:Cool SNA Visualisation Reply	
Total posts: 14 Unread posts: 0	
<input type="checkbox"/> Thread Start	Aneesha Bakharia
<input type="checkbox"/> Literature Review	Student C
<input type="checkbox"/> RE:Literature Review	Student A
<input type="checkbox"/> RE:RE:Literature Review	Aneesha Bakharia
<input type="checkbox"/> RE:Literature Review	Aneesha Bakharia
<input type="checkbox"/> RE:RE:Literature Review	Student B
<input type="checkbox"/> Sample Data for Analysis and Visualisation	Student C
<input type="checkbox"/> RE:Sample Data for Analysis and Visualisation	Student A
<input type="checkbox"/> RE:RE:Sample Data for Analysis and Visualisation	Student B
<input type="checkbox"/> RE:RE:Sample Data for Analysis and Visualisation	Aneesha Bakharia
<input type="checkbox"/> RE:Sample Data for Analysis and Visualisation	Student B
<input type="checkbox"/> Cool SNA Visualisation	Student A
<input type="checkbox"/> RE:Cool SNA Visualisation	Student B
<input type="checkbox"/> RE:Cool SNA Visualisation	Aneesha Bakharia

What's going on
in these discussion forums?



Social Network Analysis to gain insight into peer-peer and peer-mentor dynamics (SNAPP tool)

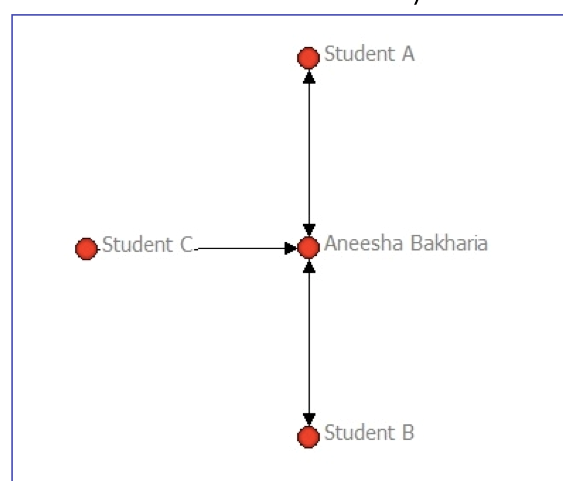
FORUM A

Thread: Thread Start Reply

Total posts: 14 Unread posts: 0

- Thread Start Aneesha Bakharia
- SNA Tools Student A
- RE:SNA Tools Aneesha Bakharia
- RE:RE:SNA Tools Student B
- RE:RE:SNA Tools Student C
- RE:RE:RE:SNA Tools Aneesha Bakharia
- Centrality analysis Student A
- RE:Centrality analysis Aneesha Bakharia

- No student interaction
- All interaction via Tutor/Lecturer



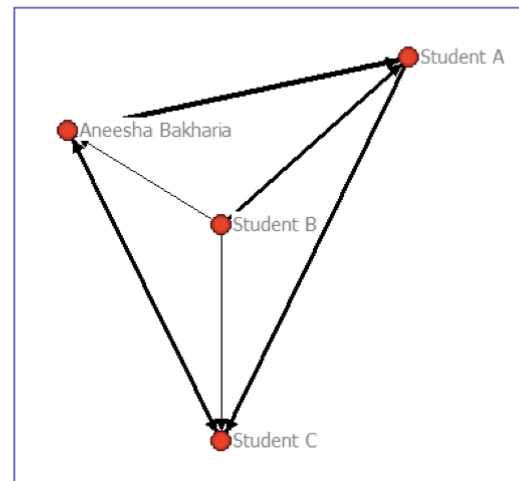
FORUM B

Thread: RE:Cool SNA Visualisation Reply

Total posts: 14 Unread posts: 0

- Thread Start Aneesha Bakharia
- Literature Review Student C
- RE:Literature Review Student A
- RE:RE:Literature Review Aneesha Bakharia
- RE:Literature Review Aneesha Bakharia
- RE:RE:Literature Review Student B
- Sample Data for Analysis and Visualisation Student C
- RE:Sample Data for Analysis and Visualisation Student A

- Student to student social interaction beginning

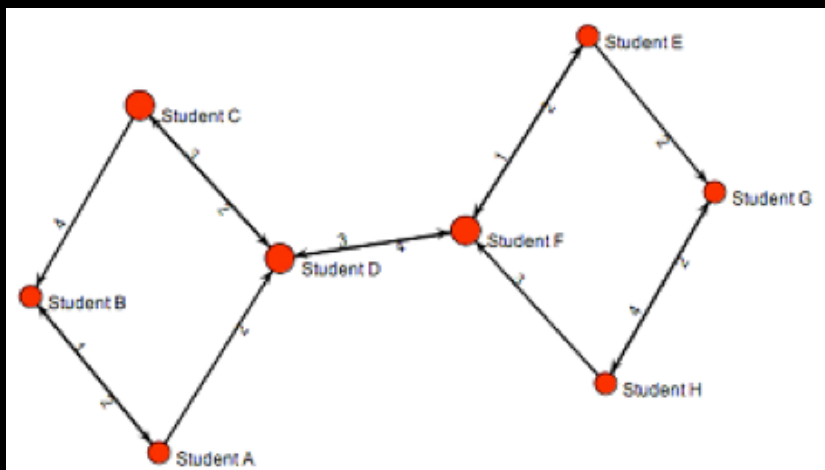


<http://www.slideshare.net/aneeshabakharia/snapp-20minute-presentation>

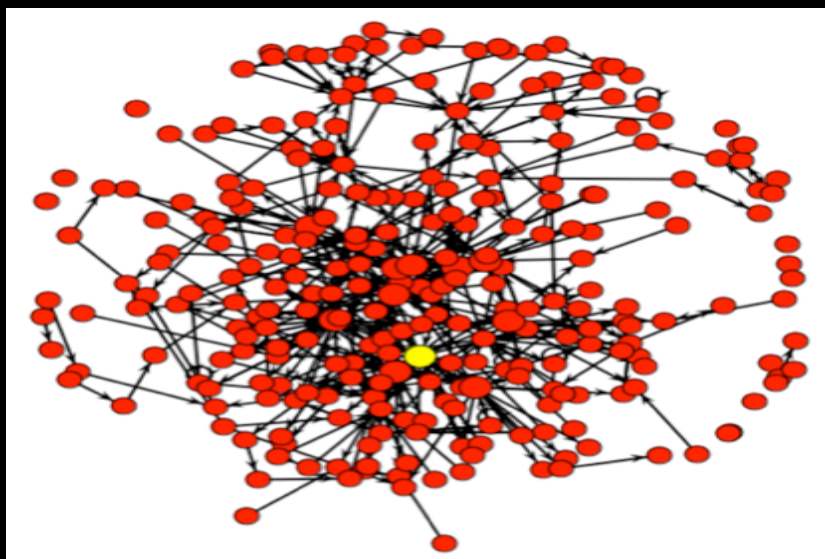
Bakharia A and Dawson S. (2011) SNAPP: a bird's-eye view of temporal participant interaction. *Proceedings of the 1st International Conference on Learning Analytics and Knowledge*. Banff, Alberta, Canada: ACM, 168-173.



Social Network Analysis (SNAPP)



2 learners connect
otherwise separate
clusters

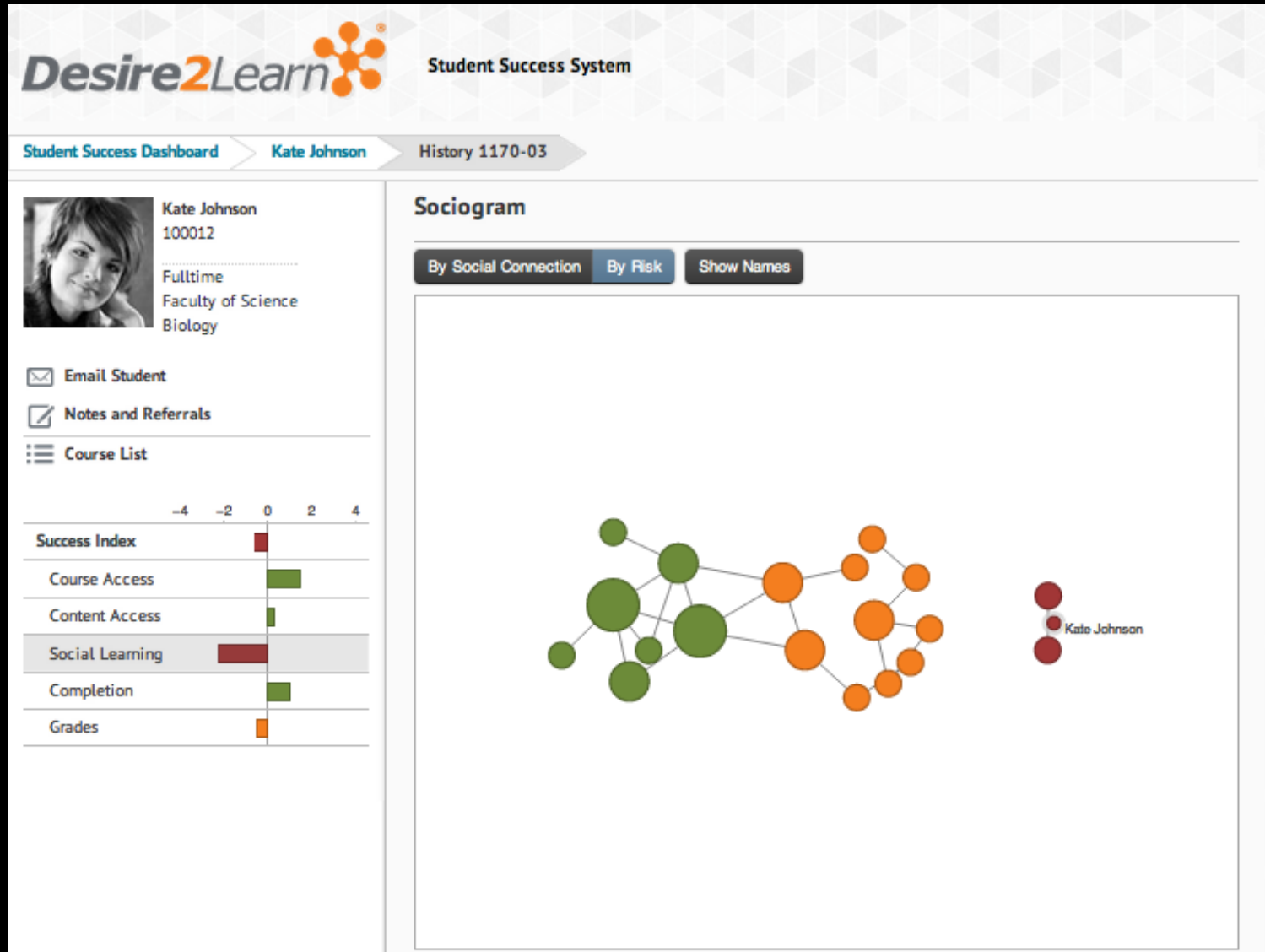


● tutor only engaging
with active students,
ignoring disengaged
ones on the edge

Social Learning Analytics about to appear in products...



<http://www.desire2learn.com/products/analytics> (this is from a beta demo)

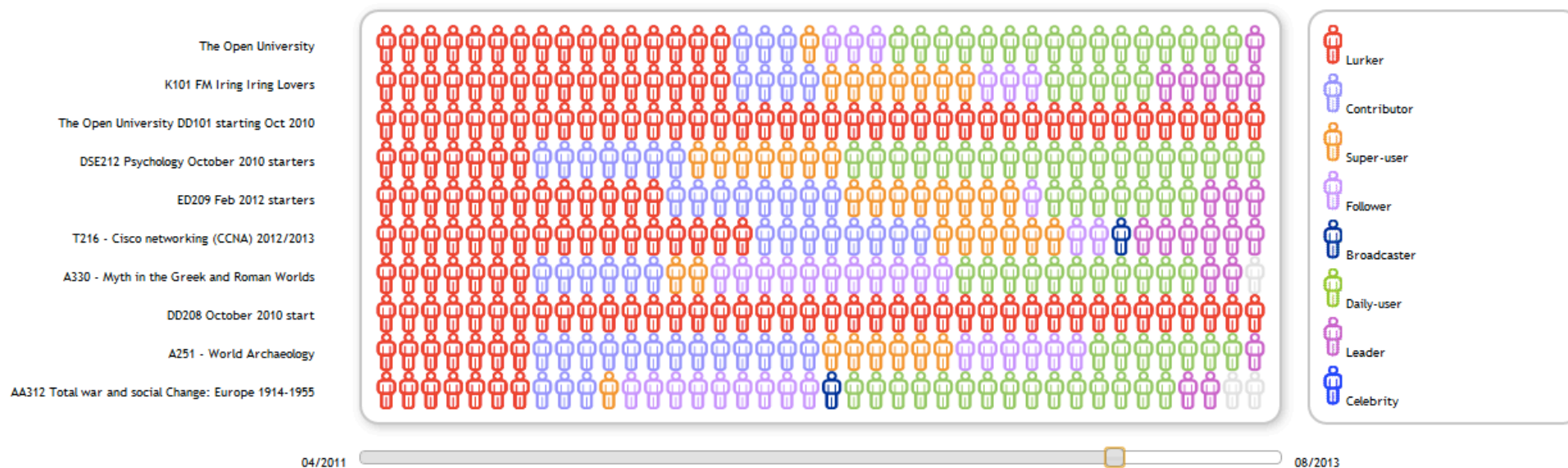


Visualizing activity in OU Facebook sites

What do students say about their courses, and what are the patterns of engagement in online communities?



OU Social - Role Coverage for Top 10 Groups



**discourse analytics for
using language as
a knowledge-
building tool**

1st International Workshop on Discourse-Centric Learning Analytics



solaresearch.org/events/lak/lak13/dcla13

**Beyond number / size / frequency
of posts; 'hottest thread'**

**analytics that look
beneath the surface,
and quantify linguistic
proxies for 'deeper
learning'**

Discourse analytics on webinar textchat



The screenshot displays a webinar interface with three main sections:

- Participants:** A list of names including Nany, Nick Freear (Away), Nigel Pigott, Non, Olga_Semenova, Pat Grace, Paul Mundin (Away), Paul Richardson, Peter Wilson, Richenda Power, RJI, RoughBounds, russell gurbutt, S Sparrius, santy 1, Steve B 1, Steve Swithenby, svyukn, Teemum, Teresa Connolly, Thanh Le, Tim Hunt, Tina, Tony Hirst, Tullmann, vjkh, Walter Patterson, Wendy Maples, Will laptop, and Will Stewart.
- Chat:** A window showing a list of messages. The first message is from a moderator: "Moderator: gmm eddy: juliette: when i was teaching 5 years ago, fairly mainstream stuff, I also found the lack of appropriate content out there was the main issue, but may have changed since". Other messages include: "Michelle 'Eingang' Hoyle: Juliette: I guess that goes back to Non saying that content creators need to tie into semantic web ideas. Unfortunately a lot of Little OER people are doing these projects on little resources and self-learned skills, so they don't have the expertise or even know that semantic web would be useful or how to go about it.", "Will Stewart: Yes, I agree. Using technology to maintain", "Andy Lane: Exact URL for SideCAP course on OpenLearn is <http://labspace.open.ac.uk/course/view.php?id=4449>", "Will Stewart: ..maintain status quo", "IsaacParlay: @Tim Hunt - got it. And agreed. A key issue I am driving at here is being able to locate the relevant / most appropriate work to build upon which seems to be a bit of an obstacle obstacle at the moment", "fred garnett: Isn't quality a euphemism for professionalism? We are in a time of changing professional roles and the nature of... assurance will change. Is it the product or process?", and "FranciscoAlvarez: researchers usually are not very found to openness? Perhaps linking opening".
- Whiteboard - Main Room (Scaled 94%):** A window titled "Useful Links" containing a list of links:
 - The Course Wiki
<http://climatechangecourse.wetpaint.com>
 - sideCAP wiki (with resources)
<http://sidecap.wetpaint.com>
 - The course on OpenLearn
<http://openlearn.open.ac.uk>
 - Th...

A green speech bubble points to the chat window with the text: "Can we spot the quality learning conversations in a 2.5 hr webinar?"

Discourse analytics on webinar textchat

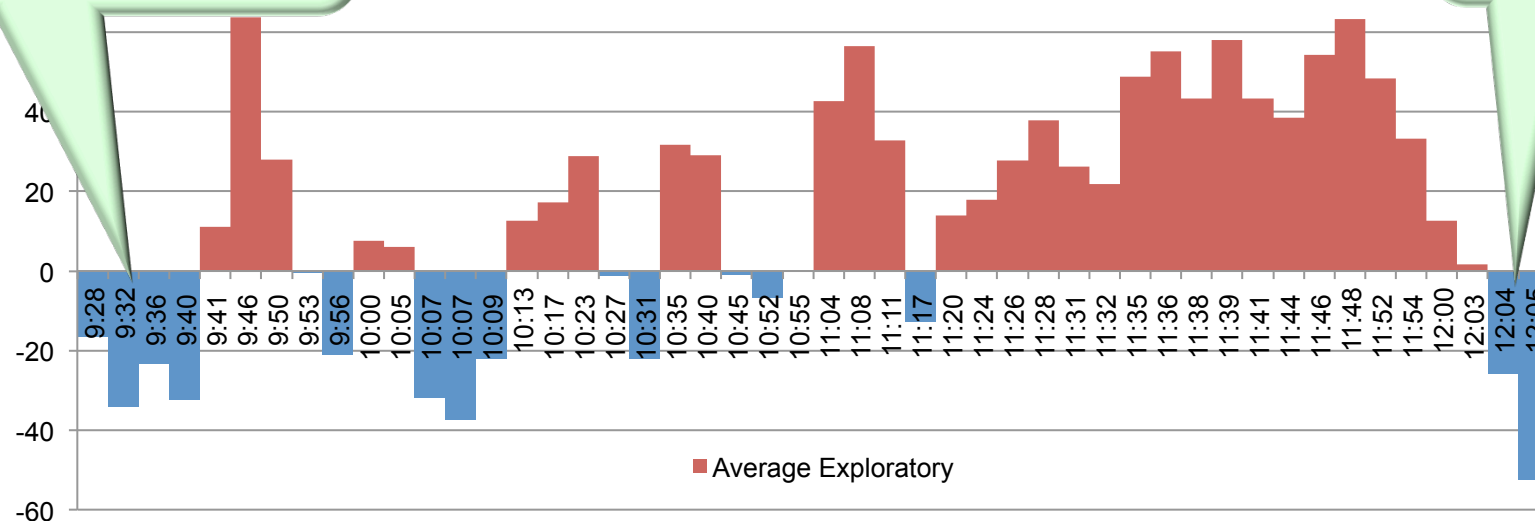


Given a 2.5 hour webinar, where in the live textchat were the most effective learning conversations?

Not at the start and end of a webinar...

Sheffield, UK not as sunny as yesterday - still warm
Greetings from Hong Kong
Morning from Wiltshire, sunny here!

See you!
bye for now!
bye, and thank you
Bye all for now

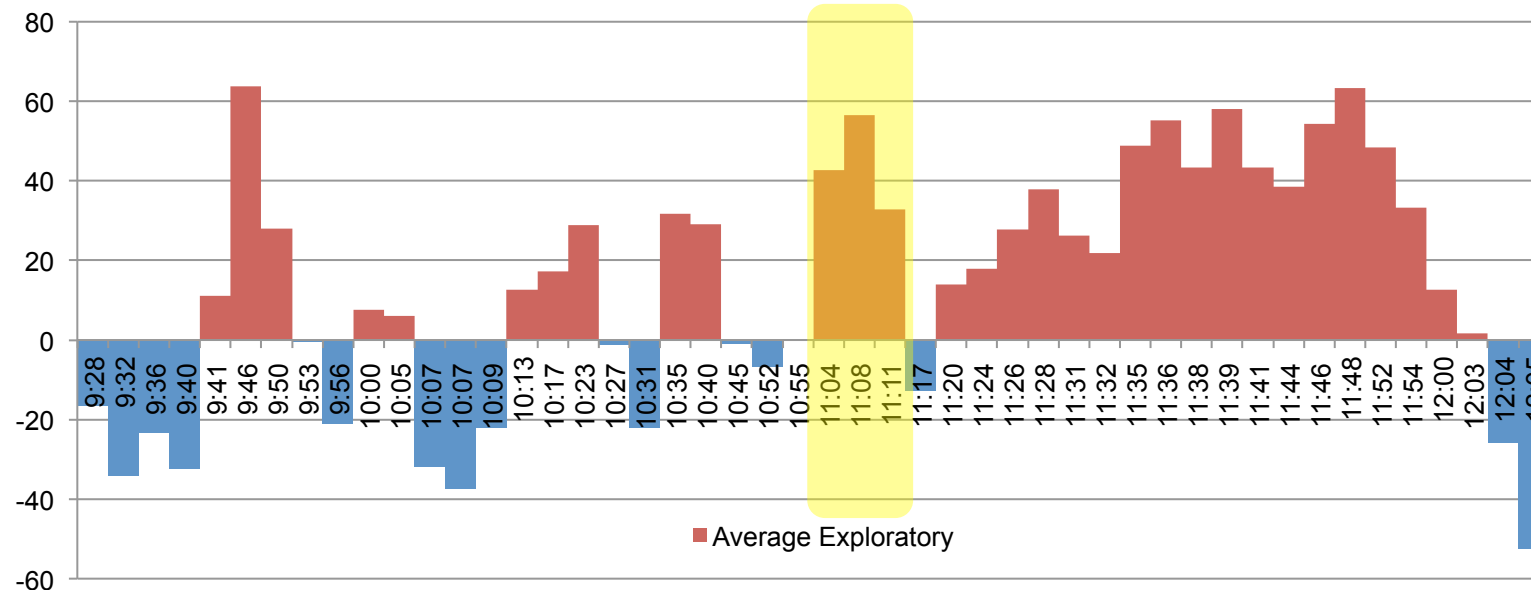


Discourse analytics on webinar textchat



Given a 2.5 hour webinar, where in the live textchat were the most effective learning conversations?

*Not at the start and end of a webinar
but if we zoom in on a peak...*

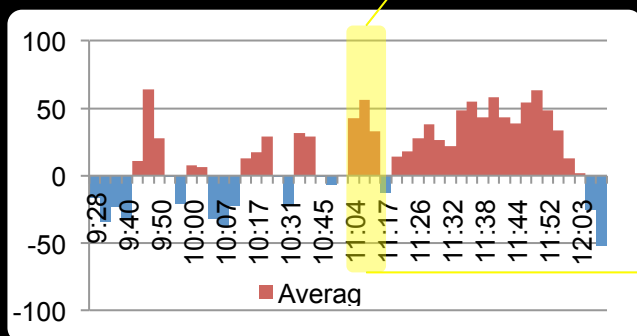




Discourse analytics on webinar textchat

Given a 2.5 hour webinar, where in the live textchat were the most effective learning conversations?

Not at the start and end of a webinar but if we zoom in on a peak...

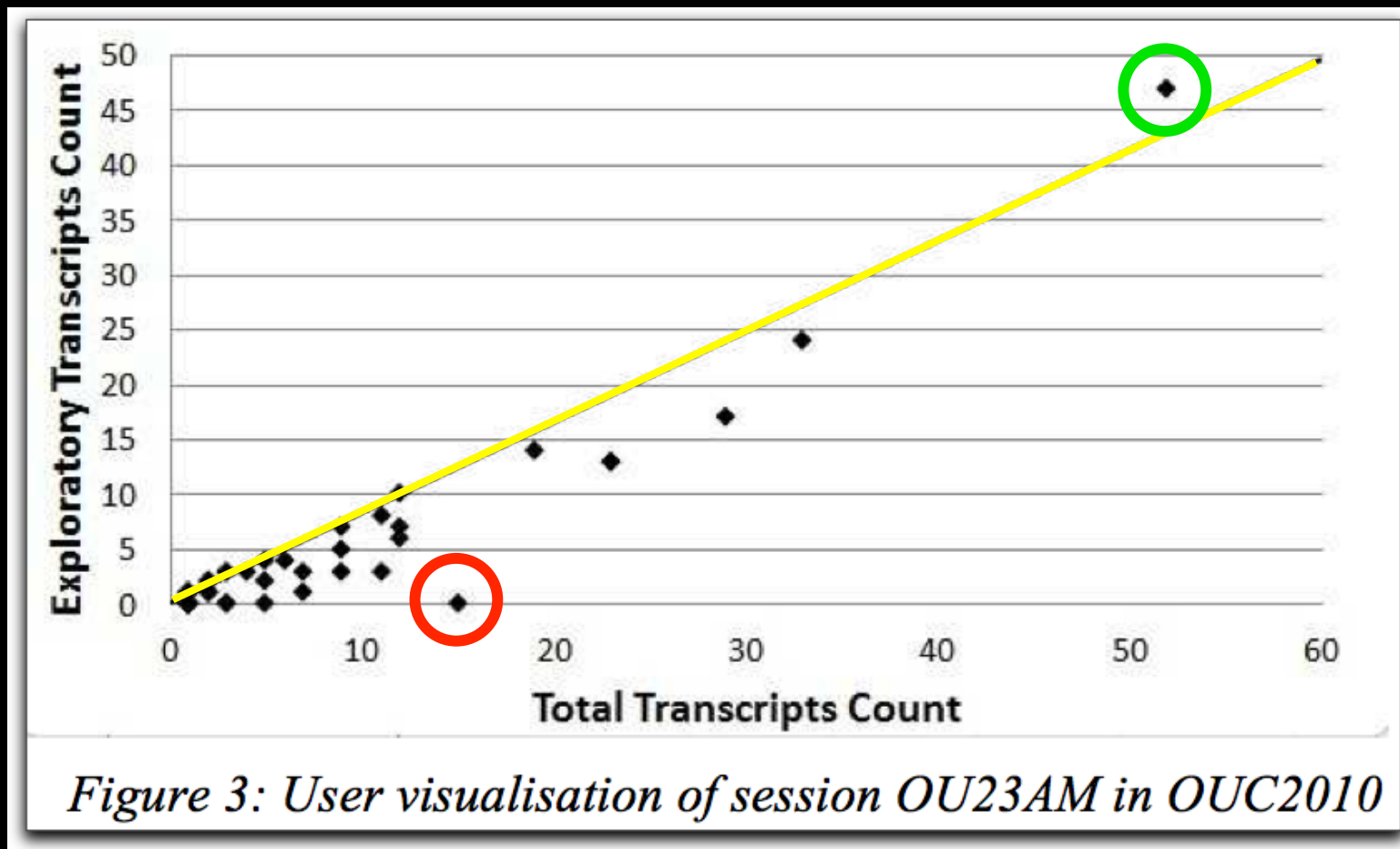


right I wonder if it also changes from introspective feel of some (of our) materials to more of an open dialogue? Course teams (not necessarily OU) can become incredibly blinkered during the period of writing a course and an additional external view is valuable	
Is the authoring out loud model best suited for new, emerging fields? Introduction to Algebra might go be so ripe for this model -- unless there was a novel dimension to it, eg. a new way of teaching it, or for s niche audience hello Helen!	
OK i take your point - I think there are points when it could really help. Eg. inviting ALs and students in to comment on course outlines or particularly tricky chunks of material. Yes - take your point. would you like me to speak? I'm just wondering how 'team work' works when live authoring is used? That's what I was looking for Tony - lovely, "Conversational" is the term <RT>@Tony Does the meaning of 'a course' change through the process? I.e. there is effectively a different learning process (course) in the preparation of the actual course.</RT>	Classified as "exploratory talk" (more substantive for learning)
I'd also like to point out that this particular model is more agile, not just in initial development but in ongoing development. "Traditional" OU courses are written and pretty much well fixed in stone for extended periods of time.	
The link to the artist who painted the image I used on one of my slides is Steve Russell http://www.russellstudio.co.uk/russell_studio/steve_russell.html	"non-exploratory"

Discourse analytics on webinar textchat



Visualizing by individual user. The gradient of the threshold line is adjusted to every 5 posts in 6 classified as “Exploratory Talk”



“Rhetorical parsing” to identify constructions signifying scholarly writing



OPEN QUESTION:

“... little is known ...”

“... role ... has been elusive”

“Current data is insufficient ...”



SURPRISE:

“We have recently observed ... surprisingly”

“We have identified ... unusual”

“The recent discovery ... suggests intriguing roles”

CONTRASTING IDEAS:

“... unorthodox view resolves ...”

“In contrast with previous hypotheses ...”

“... inconsistent with past findings ...”

<http://technologies.kmi.open.ac.uk/cohere/2012/01/09/cohere-plus-automated-rhetorical-annotation>

De Liddo, A., Sándor, Á. and Buckingham Shum, S., Contested Collective Intelligence: Rationale, Technologies, and a Human-Machine Annotation Study. *Computer Supported Cooperative Work*, 21, 4-5, (2012), 417-448. <http://oro.open.ac.uk/31052>

Simsek D, Buckingham Shum S, Sándor Á, De Liddo A and Ferguson R. (2013) XIP Dashboard: <http://oro.open.ac.uk/37391>

“What are the key contributions of this text?”



Xerox Research Centre Europe

Human analyst

The primary goal of this project was to conduct an exploratory research study to determine if providing a professional development program using open education resources (OER) would help teachers begin to transform their curriculum and teaching through the use of technology. Our eight-year Maine Learning Technology Initiative (MLTI) experience had shown us that while providing laptops to all middle school teachers and students has had many positive impacts on schools, classrooms and learning, many mathematics teachers still had not fully integrated the laptop technology into their teaching. Accordingly, this research study was designed to determine the impacts of helping a group of middle school and high school mathematics teachers, through professional development with mathematics OER, to teach targeted algebra topics using technology.

Comment [Pangioti 1]: Brief summary

Several key activities were undertaken in this project over an 18-month time period. First, we attempted to conduct an environmental scan to determine the challenges teachers encounter in using OER. Although the use of OER has grown quite extensively in higher education and K-12 settings in developing countries, OER use by K-12 teachers in the United States appears to be limited. The purpose of this activity was to explore why this was the case, to identify challenges teachers encounter in using OER, and to develop strategies for overcoming these challenges through our professional development program and research. This environmental scan consisted of several activities, including interviews with leading OER experts and proponents, surveys of teachers, and a limited number of focus groups. Through these activities we began to draw conclusions about the use of OER in K-12 school settings, and these conclusions are discussed below under Lessons Learned.

Comment [Pangioti 2]: summary

Comment [Pangioti 3]: good arguments, rigorous methodology

Comment [Pangioti 4]: multiple methods

Computational analyst

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<http://technologies.kmi.open.ac.uk/cohere/2012/01/09/cohere-plus-automated-rhetorical-annotation>

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Social Learning Analytics



Buckingham Shum, S., & Ferguson, R. (2012). Social Learning Analytics. *Educational Technology & Society*, 15 (3), 3–26.

Social Learning Analytics

Simon Buckingham Shum^{1*} and Rebecca Ferguson²

¹Knowledge Media Institute & ²Institute of Educational Technology // The Open University, Milton Keynes MK9 3AA, United Kingdom // S.Buckingham.Shum@open.ac.uk // R.M.Ferguson@open.ac.uk

*Correspondence author

ABSTRACT

We propose that the design and implementation of effective *Social Learning Analytics (SLA)* present significant challenges and opportunities for both research and enterprise, in three important respects. The first is that the learning landscape is extraordinarily turbulent at present, in no small part due to technological drivers. *Social learning* is emerging as a significant phenomenon for a variety of reasons, which we review, in order to motivate the context associated technical challenges. These analytics and implementing an SLA data are now of increasing importance. We suggest that *Social Learning Analytics* trends, and consider

Keywords

Learning Analytics



Home

About

Social Learning Analytics symposium

Posted by Simon Buckingham Shum in Learning analytics, Technology



Social Learning Analytics symposium
— student work-in-progress

A SoLAR Storm event hosted by the Open University SocialLearn Research Project

KMI Podium, Level 4, Berrill Building, Open University, UK [\[map\]](#)

12.30 Lunch

Programme: 2-5pm Tues 26 June [\[convert timezones\]](#)

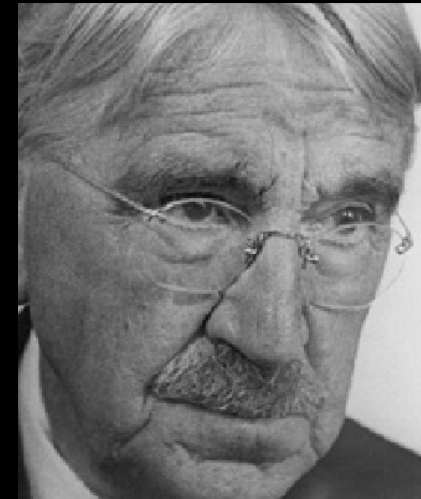
- Explosive growth in social media
- The open/free content paradigm
- Evidence of a global shift in societal attitudes which increasingly values participation
- Innovation depends on reciprocal social relationships, tacit knowing

intrinsic motivation
self-regulation
resilience



Why do dispositions matter?

“Knowledge of methods alone will not suffice: there must be the desire, the will, to employ them. This desire is an affair of personal disposition.”



John Dewey



Why do dispositions matter?

“In the growth mindset, people believe that their talents and abilities can be developed through passion, education, and persistence ...

**It’s about a commitment to ...
taking informed risks ...
surrounding yourself with
people who will challenge you
to grow”**



Carol Dweck



Why do dispositions matter?

“We’re looking at the profiles of what it means to be effective in the 21st century. [...] Resilience will be the defining concept. When challenged and bent, you learn and bounce back stronger.”



“Dispositions are now *at least* as important as Knowledge and Skills. ...They cannot be taught. They can only be cultivated.”

John Seely Brown

US Dept. of Educ. <http://reimaginingeducation.org> conference (May 28, 2013)

Dispositions clip: <http://www.c-spanvideo.org/clip/4457327>

Whole talk: <http://www.c-spanvideo.org/program/SecD>



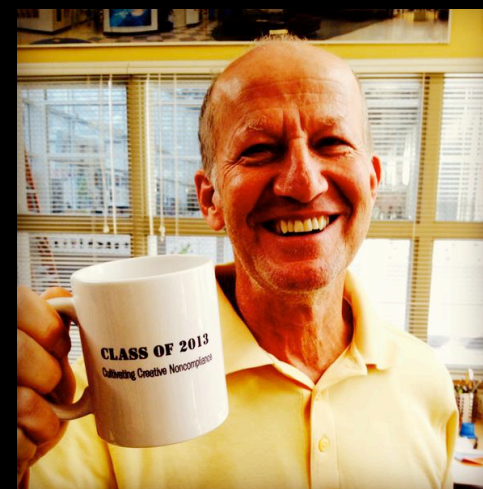
Why do dispositions matter?

“It’s more than knowledge and skills.

**For the innovation economy,
dispositions come into play:
readiness to collaborate;
attention to multiple
perspectives; initiative;
persistence; curiosity.**

**The purpose of learning in the 21st century
is not to recite inert knowledge but to
transform it.**

It’s time to change the subject.”



Larry Rosenstock

LearningREimagined project: <http://learning-reimagined.com>

Larry Rosenstock:

<http://audioboo.fm/boos/1669375-50-seconds-of-larry-rosenstock-ceo-of-hightechhigh-on-how-he-would-re-imagine-learning>

**How can we model and
quantify learning
dispositions in order
to develop analytics?**

**Learning Analytics
Summer Institute (LASI)**
Stanford University, July 1-5 2013



SOLAR
SOCIETY for LEARNING
ANALYTICS RESEARCH



Dispositional Learning Analytics Workshop



We've just got back from an intensely busy, creative and enjoyable week at LASI13, Stanford University, where Ruth Deakin Crick, Chris Goldspink, Rebecca Ferguson, Nelson Gonzalez and I (online!) contributed to the

programme. Ruth and Rebecca were both blogging, so you can get their in-situ reflections, and I'm sure there'll be more to follow as we unpack the many ideas.

Following a successful Dispositional Learning Analytics workshop, on which we've had very positive feedback, awareness should grow of *Learner* Dispositions (or Mindset as Dweck calls it), *Teacher* Dispositions, the potential of a multi-level *Complex Systems* approach



<http://learningemergence.net/events/lasi-dla-wkshp>

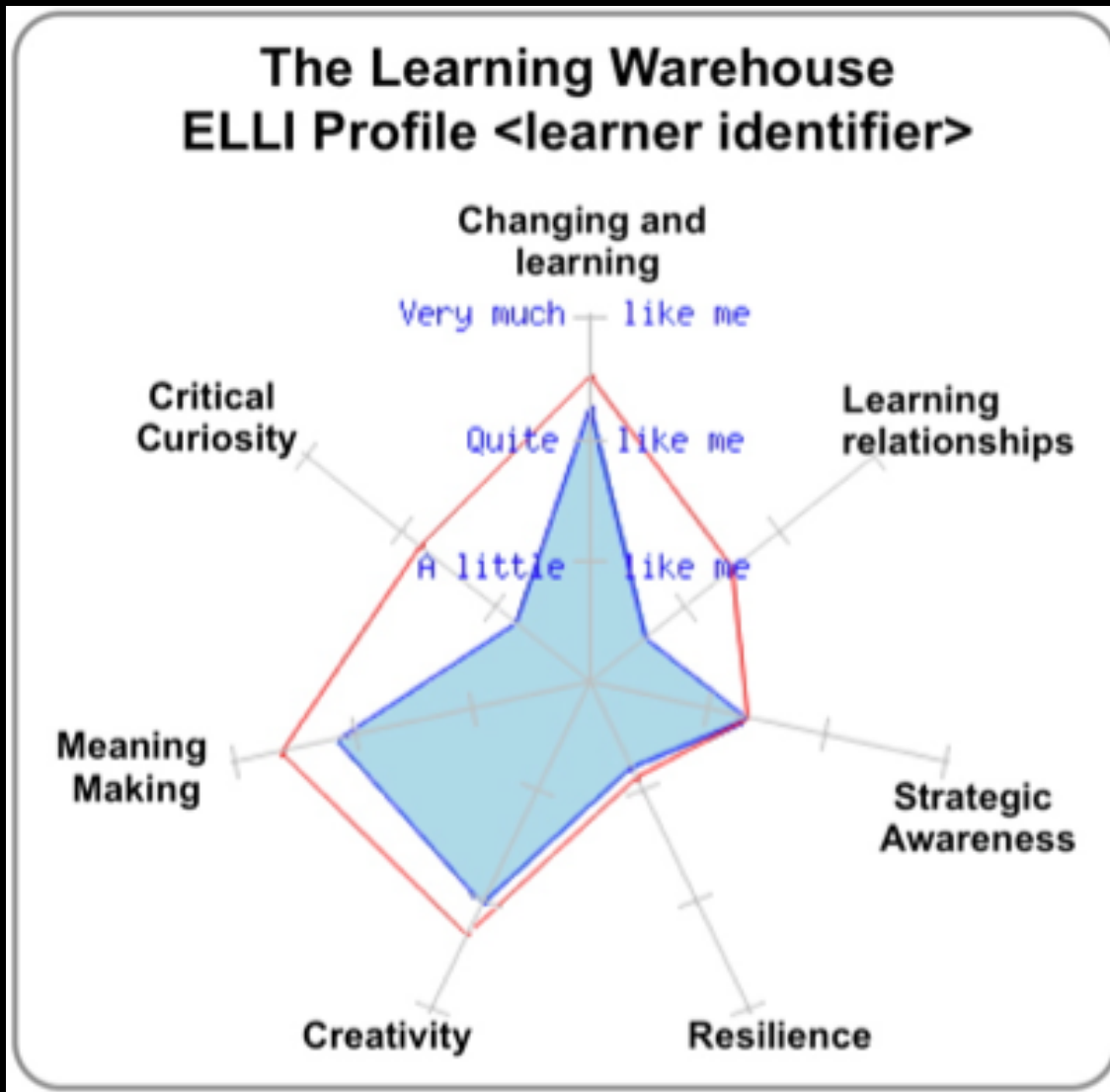
Validated as loading onto 7 dimensions of “Learning Power”



Ruth Deakin Crick
Grad. School of Education

Being Stuck & Static	↔	Changing & Learning
Data Accumulation	↔	Meaning Making
Passivity	↔	Critical Curiosity
Being Rule Bound	↔	Creativity
Isolation & Dependence	↔	Learning Relationships
Being Robotic	↔	Strategic Awareness
Fragility & Dependence	↔	Resilience

Analytics for lifelong/lifewide learning dispositions: *ELLI*



Buckingham Shum, S. and Deakin Crick, R. (2012). Learning Dispositions and Transferable Competencies: Pedagogy, Modelling and Learning Analytics. *Proc. 2nd Int. Conf. Learning Analytics & Knowledge*. (29 Apr-2 May, Vancouver). Eprint: <http://oro.open.ac.uk/32823>

Learning to Learn: 7 Dimensions of Learning Power



Factor analysis of the literature plus expert interviews: identified seven dimensions of effective “learning power”, since validated empirically with learners at many levels. (Deakin Crick, Broadfoot and Claxton, 2004)



Resilience

Definition

Resilient learners like a challenge. They accept that everyone can find learning hard sometimes and are not frightened by finding something difficult. They have a high degree of 'stickability'. They are not fragile and can tolerate the feelings of anger, fear, frustration and anxiety that sometimes accompany learning.

Strategic awareness

Definition

Strategic learners think about how they learn. They talk about how they will go about something and consider the habits, preferences, strengths and weaknesses they bring to the task. They are aware of their own feelings about learning and know how to manage them. They can talk about personal learning preferences.

Critical Curiosity

Definition

Effective learners in this dimension like to delve deeper to find out what is going on. They like to 'get at the truth' by asking questions such as Why? What? When? Where? How? etc.

They are less likely to accept information uncritically or just because someone says so.

Creativity

Definition

Creative learners are playful, they like a challenge and are willing to take risks. They like to look at a problem from many different perspectives and will use their imagination, letting their mind 'float free' to find creative solutions. They listen to their intuition and follow hunches in their learning.

Learning to Learn: 7 Dimensions of Learning Power



Meaning Making

Definition

Students who effectively make meaning can link information between subject areas and across learning contexts. They connect learning at home with learning in school and learning from previous years with learning occurring now. Effective learners in this dimension engage their own values and stories in learning and create personal relevance from information they learn.

Learning Relationships

Definition

Learners who have quality learning relationships find it useful and exciting to share thoughts and ideas with others, yet they can work equally effectively on their own. They make good use of adult sources of support and guidance at home and in the community. They draw on their community's worldviews and traditions.

Changing and Learning

Definition

Learners who are strong in this dimension know that learning is learnable. They believe that through effort their minds can get bigger and stronger just as their bodies can. They gain pleasure and self-esteem from expanding their capacity to learn.

**next step: platforms for
Dispositional Learning
Analytics**

Primary School EnquiryBloggers

Bushfield School, Wolverton, UK



May
23
2012

Day 3: Answering and conclusion

Creativity, Meaning Making, Strategic Awareness

No Responses »

Today, we were looking at our questions in detail, adding and removing question we thought needed to be. We also spent sometime sitting on the carpet and descussing our ideas for our finished product for the project. We have also tried to answer most of our questions as well.

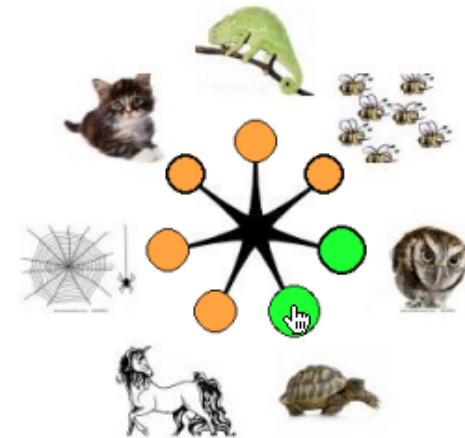
Elli dimensions:

I used my meaning making dimension because we have been trying to make links with our questions in order to answer them. We have also used our Creativity dimension, because we have been looking through our questions, and rivising to make them seem better. And finally, we have used our strategic dimention, because we have been planning out what we are going to do for our project, and how we are going to do it.

Also, could you try to email Evelyn Glennie, so I can maybe get an answer from her, about how she felt about music as a child. Don't worry if you can't, because it doesn't matter if she can't get back to me, because it doesnt affect my plan. It would be extremely helpful if you could. So please could you try, I would be most grateful.

Please get back to me as soon as you are able. Thank you,

ELLI Splder



Masters level EnquiryBloggers

Graduate School of Education, University of Bristol



Feb
23
2011

my reflections as I've considered step 3 and the questions

1. Choosing, 3. Questioning, 5. Mapping, 6. Connecting, Creativity, Critical Curiosity, Learning Relationships, Strategic Awareness

No Responses »

As I've thought about the questions, I was aware of feeling the need to have some kind of order to them, maybe simple categories. I think initially this was for my benefit, to help me sort them in my mind, not go over the same ground etc. I also think it will help me as I talk about them .

So I looked at them, grouped them and wrote them on the previous blog. i think this provoked my creativity and critical curiosity as I let the questions come. I am becoming more aware of my patterns of learning and to know when to stop and when to carry on. This has helped my own strategic awareness. I've had very valuable comments from my mentor but I have also felt able to get on with what I felt I needed to do, and I think my learning relationships have been enhanced through this process so far.

Posted by [enquirjennifermoore](#) at 6:01 pm

Feb
23
2011

I'm changing my mood to :-) Smooth sailing

Uncategorized

No Responses »

Archives

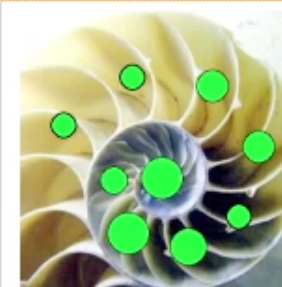
Links

Meta

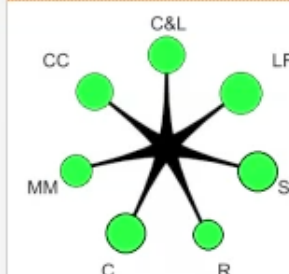
Recent Comments

January 2012
May 2011
April 2011
March 2011
February 2011
January 2011

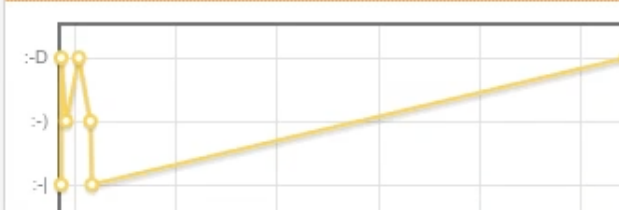
Enquiry Spiral



ELLI Spider



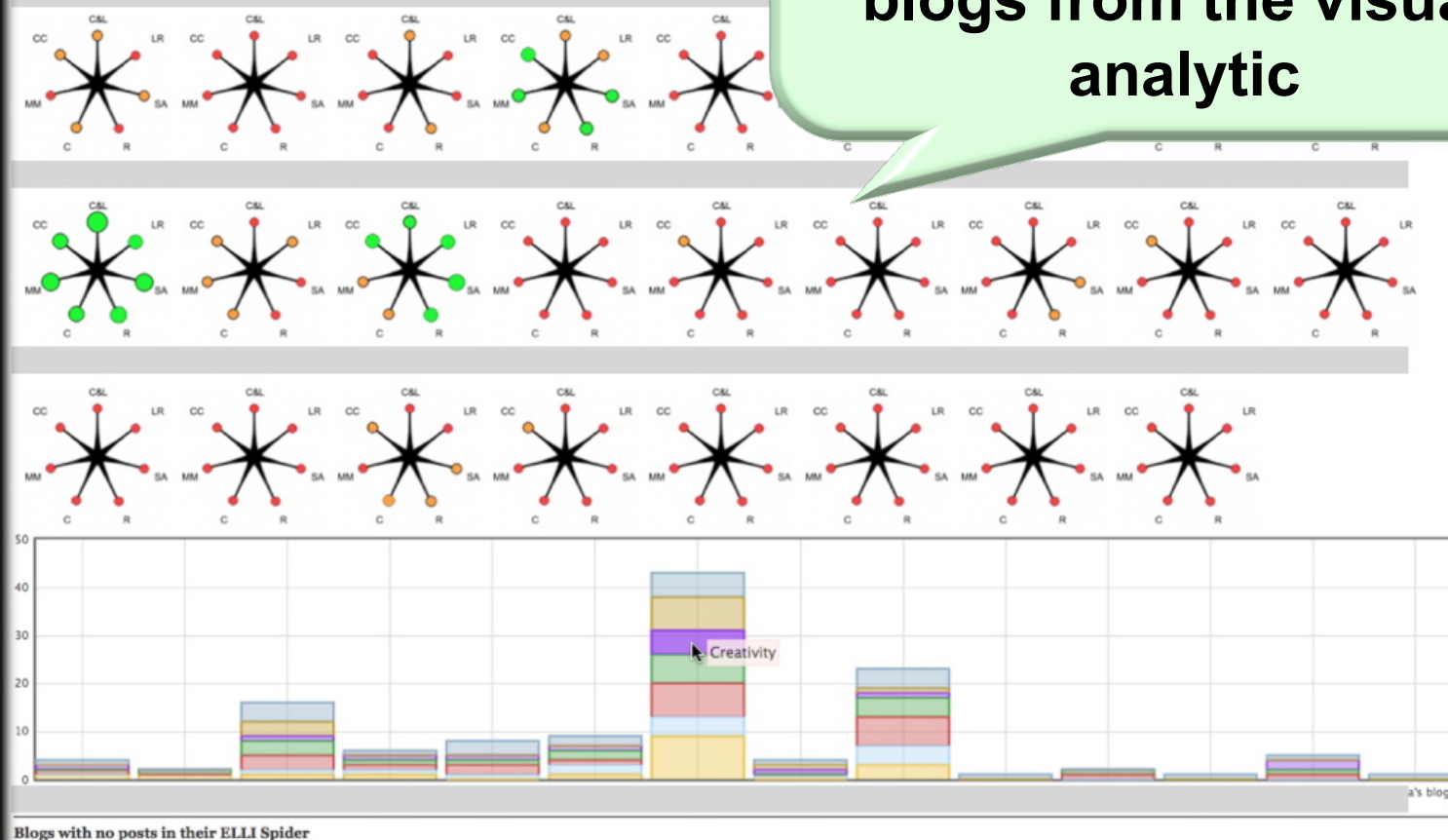
Mood View





**EnquiryBlogger
dashboard – direct
navigation to learner's
blogs from the visual
analytic**

Enquiry Spider Dashboard



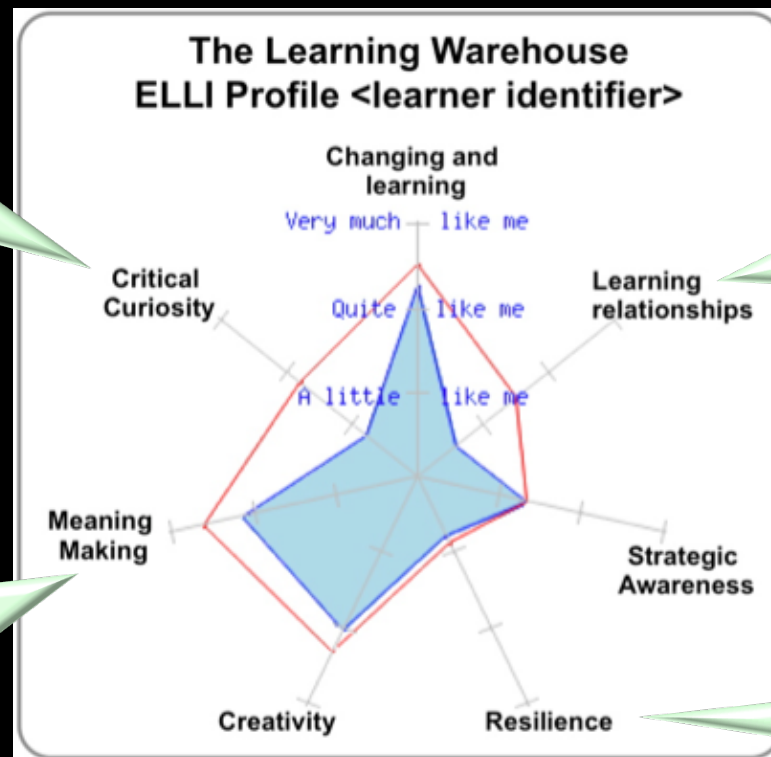
Blogs with no posts in their ELLI Spider

Could a platform generate an ELLI profile from user traces?



Questioning and challenging may load onto *Critical Curiosity*

Sharing relevant resources from other contexts may load onto *Meaning Making*



Different social network patterns in different contexts may load onto *Learning Relationships*

Repeated attempts to pass an online test may load onto *Resilience*

Envisioning a social learning analytics dashboard



Kris Mann: Analytics Dashboard

Learning dialogue analytics

1



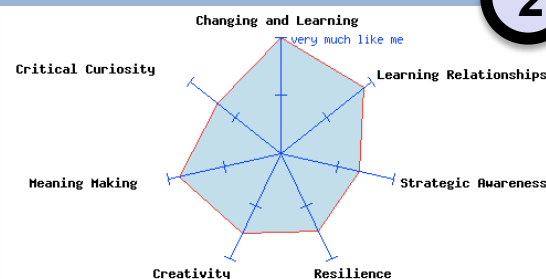
You made 6 contributions to this 30-post discussion, including three important elements of educational discussion: **reasoning, evaluation and extension**. You made less use of challenges. Positive challenges include phrases such as 'What about', 'although' and 'I'm not sure'.

[More details](#)

[Recommendations](#)

My Learning Dispositions (ELLI)

2



In your last discussion with your mentor, you decided to work on your resilience by taking on more learning challenges

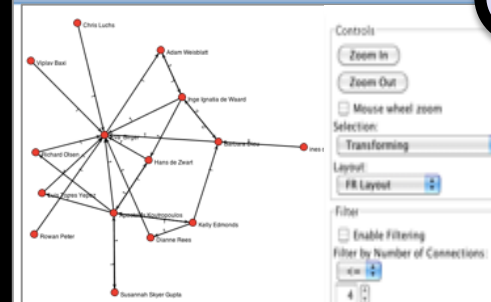
Your ELLI Spider shows that you have made a start on working on your resilience, and that you are also beginning to work on your creativity, which you identified as another area to work on.

[More details](#)

[Recommendations](#)

My Learning Network

3

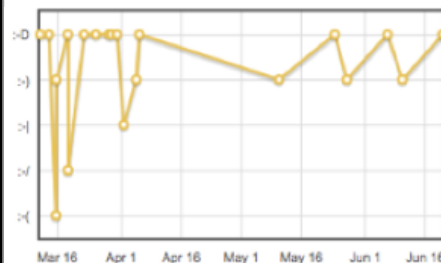


[More details](#)

[Recommendations](#)

My Mood Graph

5



Your most recent mood comment: "Great, at last I have found all the resources that I have been looking for, thanks to Steve and Ellen."

My mood is :-D Going great

[More details](#)

[Recommendations](#)

Linking my learning

4



[More details](#)

[Recommendations](#)

towards wholistic learning analytics



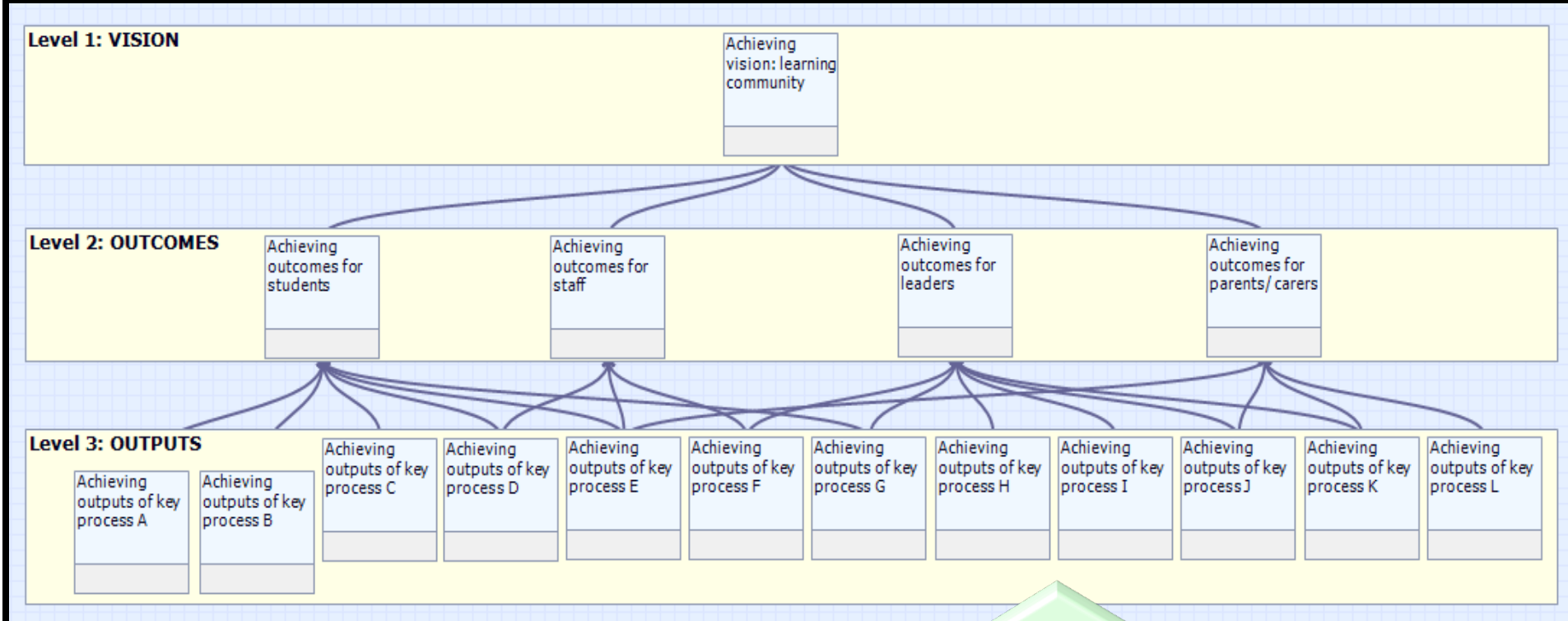
Ruth Deakin Crick, Howard Green, Steven Barr

Towards wholistic analytics on the health of a learning community

Academic results are important but less easily quantifiable measures of success are vital to many institutions' vision to nurture

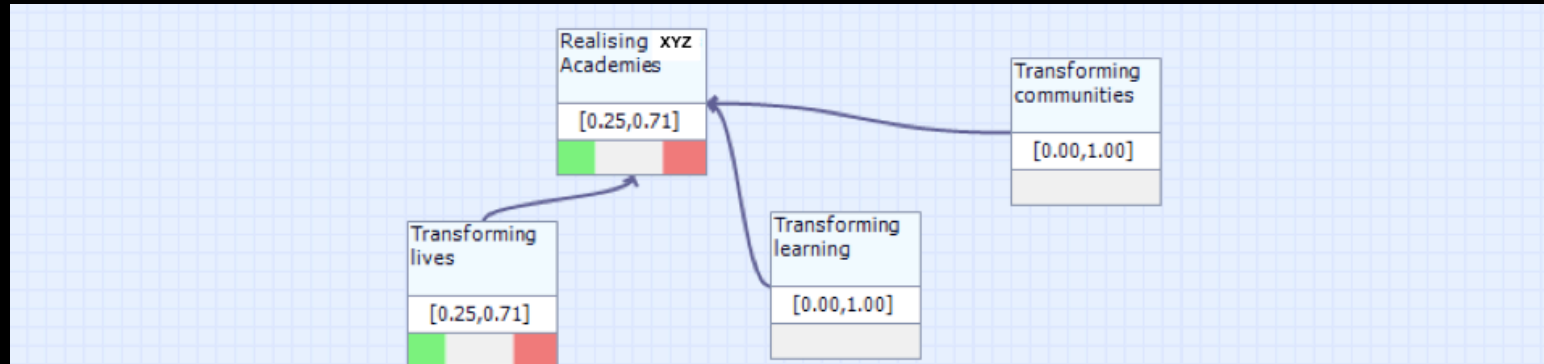
- life-long/life-wide learners**
- employability skills • citizenship**
- self-confidence • teamwork**
- emotional wellbeing...**

Hierarchical Process Modelling (Univ. Bristol *PeriMeta* tool)



Seeing a learning community as a complex adaptive system requires the voices of learners, teachers, leaders, parents and 'external' stakeholders

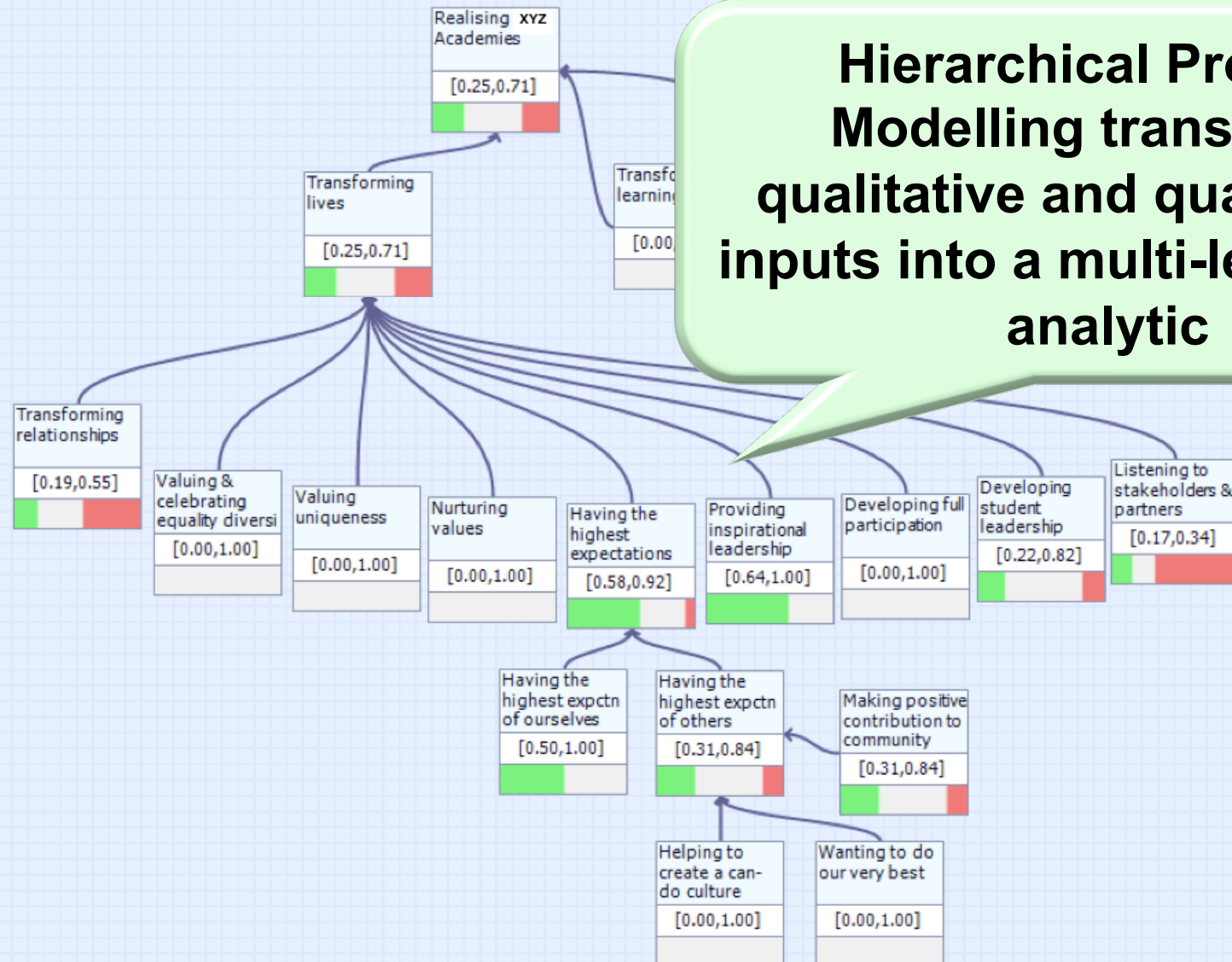
Hierarchical Process Modelling (Univ. Bristol *PeriMeta* tool)



**The core mission and values of
a network of school academies**

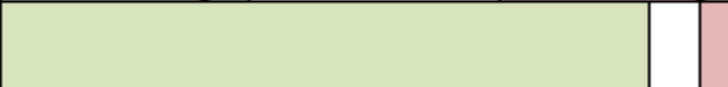



Hierarchical Process Modelling (Univ. Bristol *PeriMeta* tool)

**Hierarchical Process
Modelling transforms
qualitative and quantitative
inputs into a multi-level visual
analytic**



'Italian Flag' visual analytic

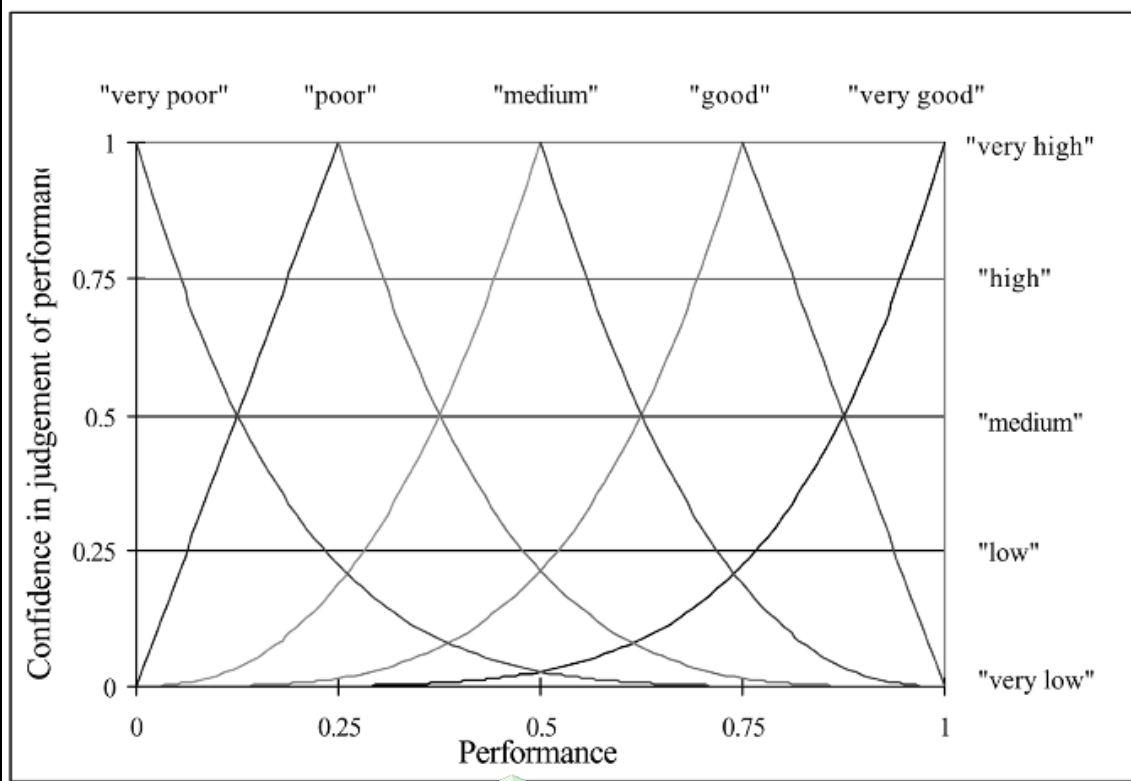
Table 12: Illustration of Italian Flag graphs in context of a learning community

Categories of evidence in Italian Flag	Evidence of success	Lack of evidence	Evidence of failure
Application to learning community	Evidence of positive self-perception of learning	Uncertainty in self-perception of learning	Evidence of negative self-perception of learning
Example: High self-perception of learning from high proportion of 'strongly agree' responses			
Example: Medium self-perception of learning from high proportion of 'agree' responses			
Example: Medium self-perception of learning from high proportion of 'disagree' responses			
Example: Low self-perception of learning indicated by high proportion of 'strongly disagree' responses			

Degree of green / white / red reflects current certainty over availability of evidence supporting / unknown / challenging

'Italian Flag' model

Table 13: Hall et al's (2004) mapping from linguistic descriptions of 'performance' and 'confidence in judgement of performance' to interval values of performance



Converting learner/leader/teachers' linguistic survey ratings and confidence into quantitative values

'Italian Flag' visual analytic

Table 5 Conversion of scores from Likert scale to Sp and Sn values of evidence

Confidence judgment	Rating					
Very high	100%	(0.00,0.00)	(0.25,0.25)	(0.50,0.50)	(0.75,0.75)	(1.00,1.00)
High	75%	(0.00,0.05)	(0.20,0.30)	(0.42,0.58)	(0.70,0.80)	(0.95,1.00)
Medium	50%	(0.00,0.10)	(0.10,0.40)	(0.38,0.62)	(0.60,0.90)	(0.90,1.00)
Low	25%	(0.00,0.25)	(0.05,0.50)	(0.30,0.70)	(0.50,0.95)	(0.75,1.00)
Very low	0%	(0.00,0.60)	(0.01,0.80)	(0.05,0.95)	(0.20,1.00)	(0.40,1.00)
Rating		0%	25%	50%	75%	100%
Performance judgment		0	1 – strongly disagree	2 - disagree	3 - agree	4 – strongly agree

Degree of green / white / red reflects current certainty over availability of evidence supporting / unknown / challenging

thorny issues

**learning analytics
are not neutral**

Accounting tools are not neutral



“accounting tools...do not simply aid the measurement of economic activity, they shape the reality they measure”

cf. Bowker and Starr's *"Sorting Things Out"*
on classification schemes



“A marker of the health of the learning analytics field will be the quality of debate around what the technology renders visible and leaves invisible.”

Analytics are infused with human values

Data does not 'speak for itself'



ethics

What kinds of learners?
What kinds of learning?

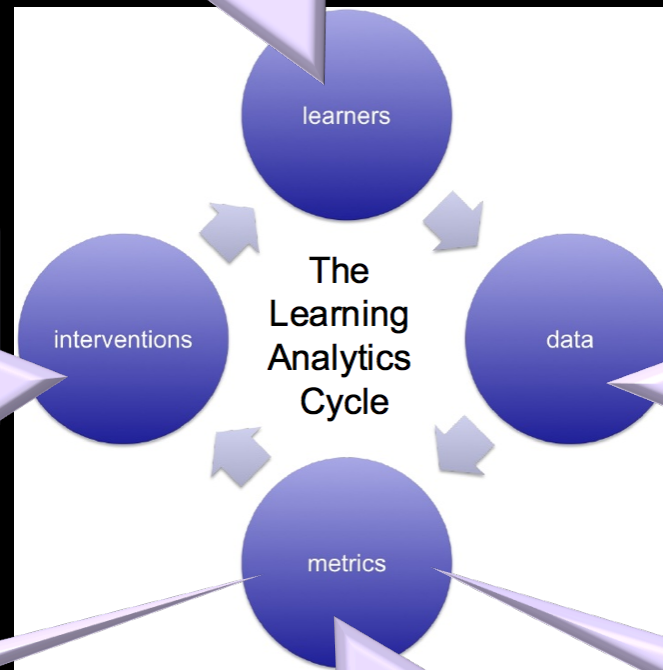
What human +/-
software
interventions /
recommendations?

What data could be
generated digitally
from the use context?
(you can invent future
technologies if need)

Does your theory
predict patterns
signifying learning?

What analytical tools
could be used to find
such patterns?

How to render the analytics,
for whom, and will they
understand them?





The Wal-Martification of education?

Episode 95: 'Learning Analytics' Could Lead to 'Wal-Martification' of College

May 2, 2012, 1:44 pm

By Jeffrey R. Young



A number of experiments are using new kinds of data – such as how many times a student has clicked on an e-textbook or logged in to a class Web page – to measure and guide learning in new ways. That could improve the student experience, but it could also end up dumbing down college, argues Gardner Campbell, director of professional development and innovative initiatives at Tech.

Download this recording as an MP3 file or subscribe to Tech Therapy.

“data narrowness”
“instrumental learning”
“students with no curiosity”

“The basic question is not
what can we measure?
The basic question is
*what does a good
education look like?*
Big questions.



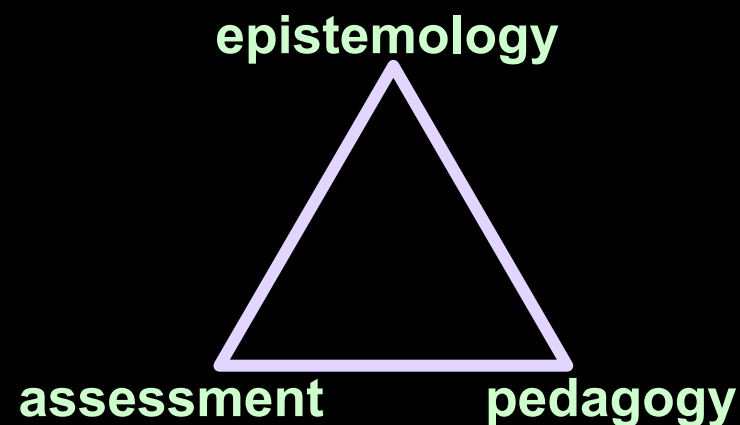
**Will staff know how to
read and write analytics?**

This will become a key literacy.



Learning technology is not neutral

**Any technology embodies
epistemological,
pedagogical and
assessment assumptions**



Algorithms are not neutral



Governing Algorithms

A conference on computation, automation, and control

<http://governingalgorithms.org>

Algorithms increasingly shape our lives: we need to go in eyes wide open, and encourage critical debate

**join the learning
analytics global
community**

Join the community...



SOLAR
SOCIETY for LEARNING
ANALYTICS RESEARCH

<http://SoLAResearch.org>





replays of all
previous
conference
presentations

<http://LAKconference.org>

Join the community...




**Learning Analytics
Summer Institute (LASI)**
Stanford University, July 1-5 2013



SOLAR
SOCIETY for LEARNING
ANALYTICS RESEARCH

**Learning Analytics
Summer Institutes
(LASI-Local)**



SOLAR
SOCIETY for LEARNING
ANALYTICS RESEARCH

**Learning Analytics Summer
Institutes, 2013**

Stanford University
and around the world f-f & online,
twitter: [#lasi13](#)


**replays of all
sessions**

**SOLAR Learning Analytics
Summer Institutes**

A field-defining week...
Be part of it!

Participate online:
Live-streams from LASI-Stanford
[SolARresearch.org/events/lasi](#)
LASI-Local global network
[SolARresearch.org/events/lasi/lasi-local](#)
LASI-eRoom
LASI-Collaboration Space


Keynotes
Panels
Workshops



<http://www.solaresearch.org/events/lasi>



JISC Briefings on Learning Analytics



CETIS Analytics Series

Vol.1, No.1
**Analytics;
What is Changing and
Why Does it Matter?**

This paper provides a high level overview to the CETIS Analytics Series. The series explores a number of key issues around the potential strategic advantages and insights which the increased attention on, and use of, analytics is bringing to the education sector. It is aimed primarily at managers and early adopters in Further and Higher Education who have a strategic role in developing the use of analytics in the following areas:

<http://publications.cetis.ac.uk/c/analytics>



EDUCAUSE Briefings on Learning Analytics

The screenshot shows the EDUCAUSE Library website. At the top is the EDUCAUSE logo and a search bar. Below this is a navigation menu with links to RESEARCH AND PUBLICATIONS, CONFERENCES AND EVENTS, CAREER DEVELOPMENT, FOCUS AREAS AND INITIATIVES, CONNECT AND CONTRIBUTE, and ABOUT EDUCAUSE. A breadcrumb trail indicates the current location: Home > EDUCAUSE Library > Information Technology Management and Leadership > Institutional Management > Analytics > Learning Analytics. A 'Favorite' button and a 'Topic Primer' button are also visible. The main content area features a heading '< EDUCAUSE Library LEARNING ANALYTICS' and a carousel of four featured items: 'State of the Field: Learning Analytics and Educational', '7 Things You Should Know About Intelligent Tutoring', 'Using Predictive Analytics to Improve Student Success', and 'Analytics and Metaphors: Grounding Our'. Below the carousel are tabs for 'OVERVIEW' and 'LIBRARY ITEMS'. At the bottom, there is a 'SUBSCRIBE' button with a RSS icon and a paragraph of text about the 2013 Horizon Report.

EDUCAUSE Search >

RESEARCH AND PUBLICATIONS **CONFERENCES** AND EVENTS **CAREER** DEVELOPMENT **FOCUS AREAS** AND INITIATIVES **CONNECT** AND CONTRIBUTE **ABOUT** EDUCAUSE

Home > EDUCAUSE Library > Information Technology Management and Leadership > Institutional Management > Analytics > Learning Analytics ★ Favorite

Topic Primer

< EDUCAUSE Library
LEARNING ANALYTICS

State of the Field: Learning Analytics and Educational

7 Things You Should Know About Intelligent Tutoring

Using Predictive Analytics to Improve Student Success

Analytics and Metaphors: Grounding Our

OVERVIEW **LIBRARY ITEMS**

SUBSCRIBE

The [2013 Horizon Report](#) describes learning analytics as the "Field associated with deciphering trends and patterns from educational big data, or huge sets of student-related data, to further the advancement of a personalized, supportive system of higher education." Below are articles, presentations and seminars that further discuss the growing use of learning analytics in higher education and the benefit students gain from it.

<http://www.educause.edu/library/learning-analytics>



Learning Analytics Policy Brief (UNESCO • IITE)



<http://bit.ly/LearningAnalytics>

Systems leadership and learning: LearningEmergence.net



Learning Emergence

deep learning | complex systems | transformative leadership | knowledge media

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Learning Emergence

@learningemerg

9 Jul

Dispositional, Complex Systems Analytics at #lasi13 bit.ly/1a84zMS Thnx everyone for a fab week! #learninganalytics



Alfred Essa

@malpaso

7 Jul

RT @ErikDuval: We've started posting the #lak13 videos at youtube.com/playlist?list=... Just in time for #lasi13 ;-)

Retweeted by Learning Emergence

Show Summary



Jentery Sayers

@jenterysayers

8 Jul

"experts could find publications...and decide

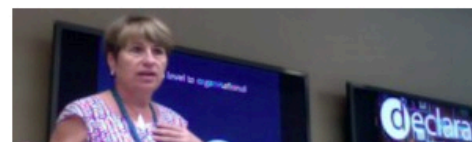
[← LearningEmergence team at Stanford](#) [DEED+ELLI+AI+CI = Systemic School](#)

[July 1-5](#)

[Learning →](#)

Dispositional, Complex Systems Analytics @ LASI

Posted on July 9, 2013 by Simon Buckingham Shum | 1 Comment



We've just got back from an intensely busy, creative and enjoyable week at [LASI13](#), Stanford University, where

CATEGORIES

[Authentic Enquiry](#) [Coaching for Learning](#) [Collaborative Learning](#) [Community Complexity](#) [Consultation](#) [Culture](#) [Ecological](#) [Age Events](#) [Language for Learning](#) [Leadership](#) [Learning Power](#) [organisational learning](#) [Pedagogy](#) [Projects](#) [Publications](#) [Resources](#) [Software](#)

**what this
all means**

The big shifts that analytics could bring...



Organisational Culture

evidence-based
decisions and
org learning

Academic Culture

data-intensive
learning sciences/
educ research

Practitioner Culture

evidence impact of
learning designs;
timely interventions

C21 Qualities

place these on a firm
empirical evidence
base

The new research+practice vista...



data-culture dynamics

how do HEIs manage
the embedding of
real time analytics
services?

sensemaking meets

computation

creative intelligence +
computational
thinking

educator data literacy

how do staff learn to
read and write
analytics?

pedagogical innovation

how do learning
analytics change
student experience?